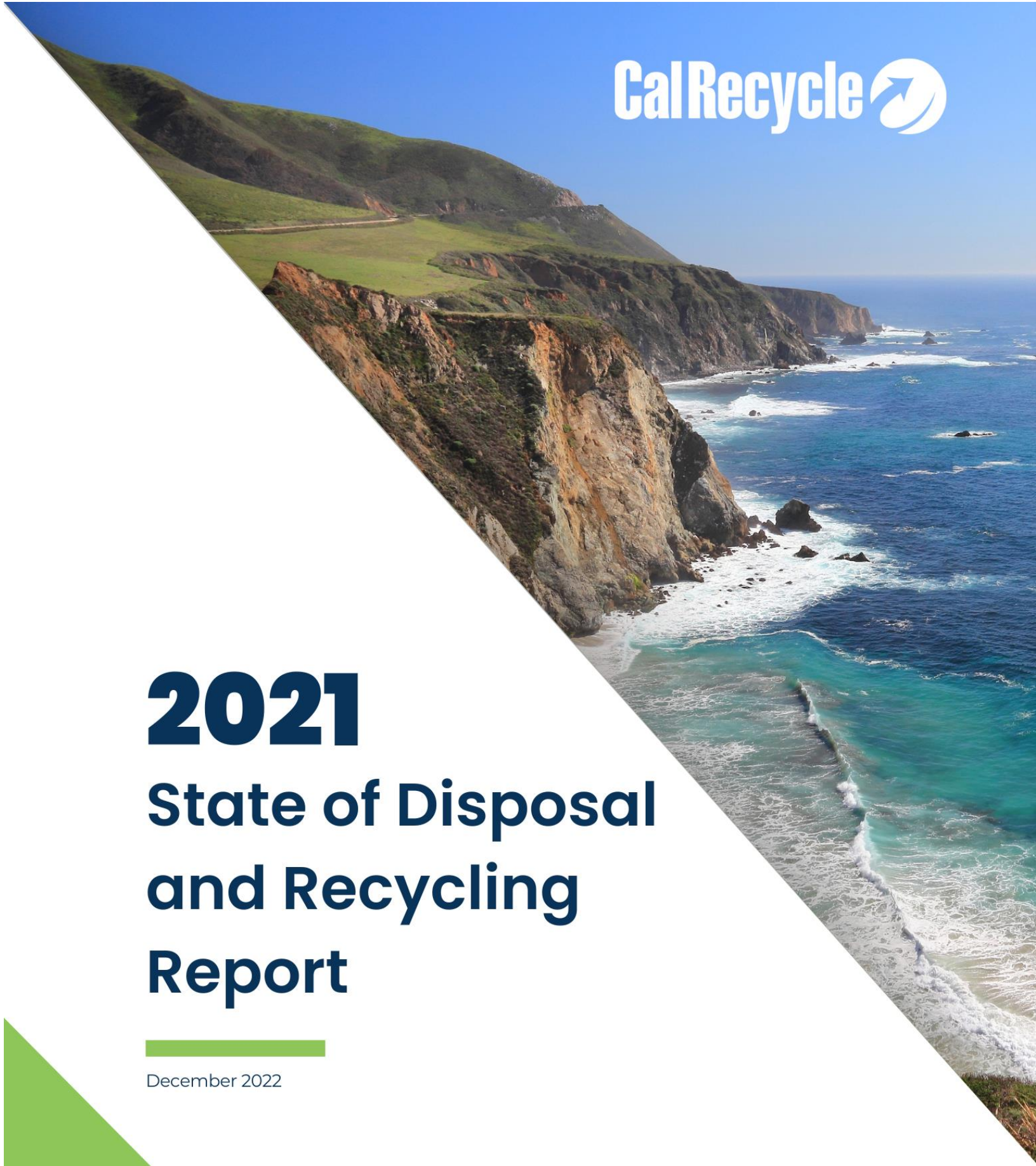


2021

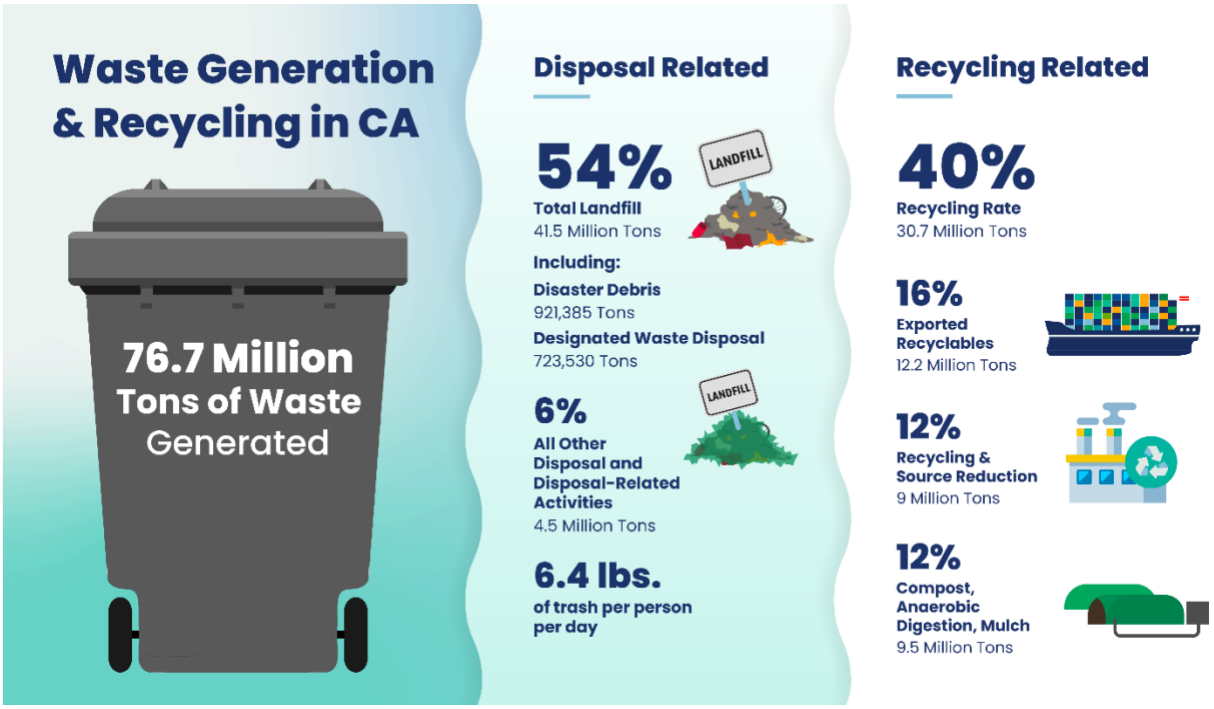
State of Disposal and Recycling Report

December 2022

Table of Contents

Executive Summary

The Calendar Year 2021 report presents data and information on California's waste management activities, including the export of recyclable materials and the statewide recycling rate.



CalRecycle estimates that California's overall waste generation in 2021 was about 76.7 million tons. Of that total waste generation, 46 million tons went to disposal and disposal-related activities, including about 41.5 million tons sent to landfill. This equates to a statewide per capita disposal rate of 6.4 pounds per person per day. Of the total amount disposed, over 920 thousand tons was disaster debris, up from 160 thousand tons in 2020.

Non-green alternative daily cover (ADC) was the most common disposal-related activity at almost 2.3 million tons. Despite this, the amount of ADC (green and non-green material) decreased for the second year in a row. In 2021, less than 2.7 million tons of ADC were used, down from 2.8 million tons in 2020 and 3.9 million tons in 2019. Much of this reduction is attributed to a decreased use of green material ADC.

An estimated 30.7 million tons of waste were source reduced, recycled, and composted in California in 2021, resulting in a statewide recycling rate of 40 percent, down from 42 percent in 2020.

Seaborne export of recyclable materials accounted for about 12.2 million tons in 2021, a decrease of approximately 1 million tons from 2020. Despite the decline, seaborne

exports of recyclable materials were the largest destination for statewide recycling. For the first time in this year's report, the amount of scrap plastics (1-7) exported via truck and rail to Mexico and Canada was estimated. In 2021, Mexico was the largest importer of scrap plastics from California, receiving more than 43 thousand tons via truck and rail.

Appendix 1 provides data tables associated with every figure in this report to ensure Americans with Disability Act (ADA) accessibility for non-sighted readers. Appendix 2 provides detailed graphics and tables on total exports and recyclable materials exports that are not included in the main report.

CalRecycle

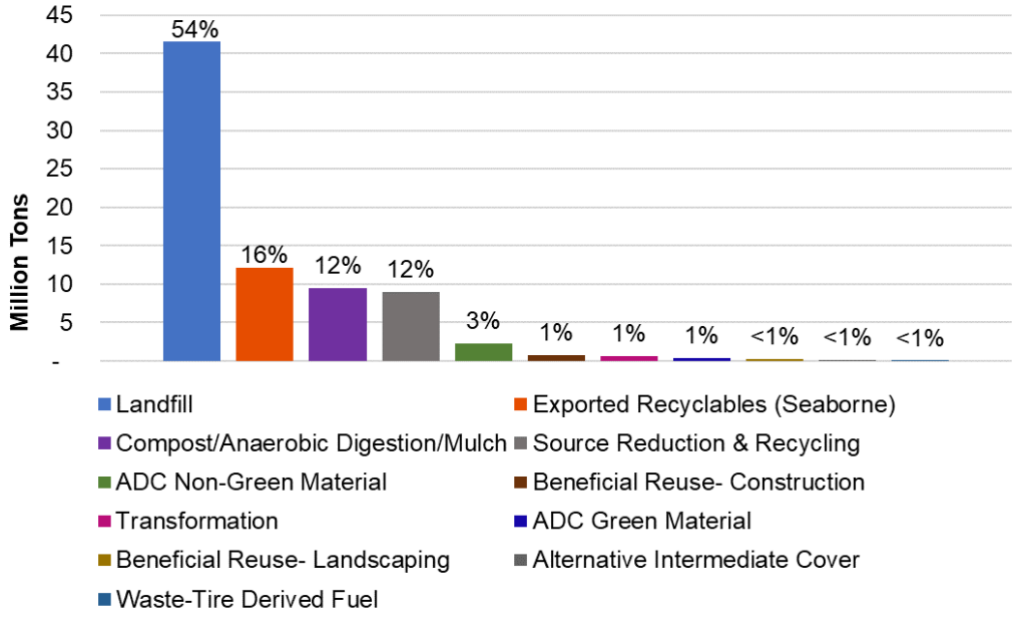
Waste Generation

California's 39.3 million residents and 1.7 million businesses generated an estimated 76.7 million tons of material in 2021*.

Of the total materials generated, 54 percent were sent to landfill, 16 percent were exported as recyclables, 12 percent were composted, anaerobically digested or mulched, and another 12 percent were recycled, or source reduced (see Figure 1). The remainder of the material, less than 6 percent, went to alternative daily cover (ADC), beneficial reuse, transformation, alternative intermediate cover (AIC), waste-tire derived fuel, and engineered municipal solid waste (EMSW).

Californians generated 76.7 million tons of trash and recycling in 2021.

Figure 1. Estimated Management of 76.7 Million Tons of Materials Generated in California in 2021



CalRecycle derived quantities of landfilled waste, transformation, ADC, AIC, EMSW, and other beneficial reuse from the Recycling and Disposal Reporting System (RDRS). Accessed September 2022. No EMSW was reported in 2021. CalRecycle calculated waste tire-derived fuel based on data reported to CalRecycle (1). CalRecycle collected exported recyclables data from WISERTrade. (2). Accessed February and March 2022. CalRecycle collected estimates for materials composted, anaerobically digested, and mulched based on published reports (3; 4)

* CalRecycle determined total generation from the 1990-2010 per person baseline and the 2021 population in California.

Disposal and Disposal-Related Activities

In 2021, Californians threw away 6.4 pounds per person per day or the equivalent of the weight of a classic VW bug (2,342 pounds).

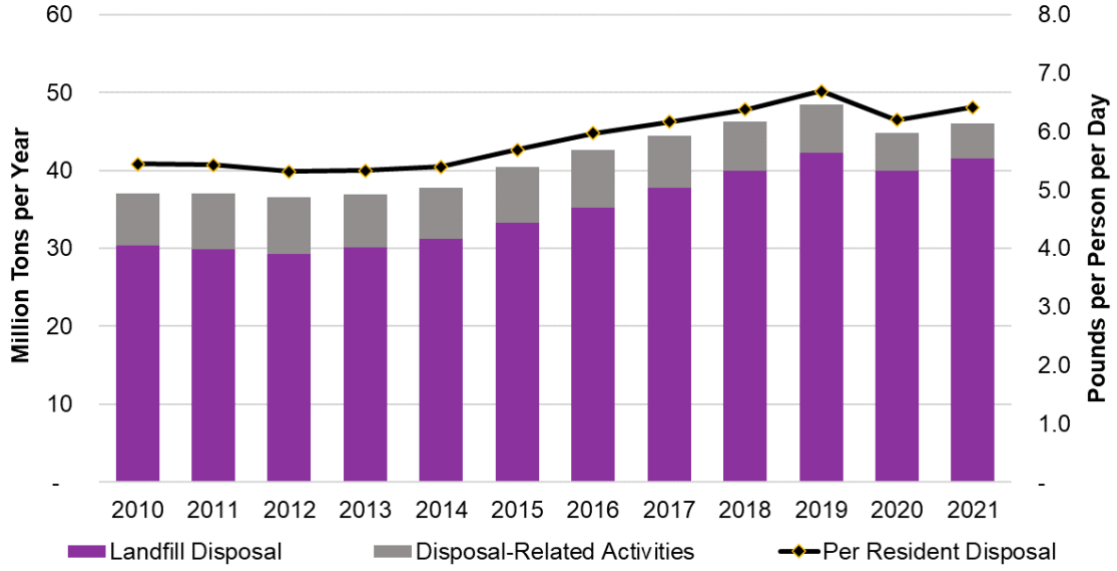
To calculate overall disposal, CalRecycle adds tons of landfill disposal [as used in the Assembly Bill (AB) 939 jurisdiction calculations] to tons from six disposal-related activities: ADC, AIC, transformation, EMSW, waste-tire derived fuel, and other beneficial reuse at landfills (such as construction activities, landscaping, and erosion control). The calculated overall disposal is subsequently used to determine the statewide recycling rate.

Based on data reported to CalRecycle, overall disposal in 2021 was about 46 million tons, including disposal and disposal-related activities.

In 2021, 41.5 million tons of waste were landfilled in California or in out-of-state landfills, including disaster debris and designated waste[†]. An additional 4.5 million tons of materials went to disposal-related activities. California had a per capita overall disposal rate of 6.4 pounds per resident per day (see Figure 2), including both disposal and disposal-related activities, corresponding to approximately 2,342 pounds of disposal per resident in 2021.

[†]"Designated waste" is defined in CA Water Code § 13173 (2017) and means either of the following:
(a) Hazardous waste that has been granted a variance from hazardous waste management requirements pursuant to Section 25143 of the Health and Safety Code.
(b) Nonhazardous waste that consists of, or contains, pollutants that, under ambient environmental conditions at a waste management unit, could be released in concentrations exceeding applicable water quality objectives or that could reasonably be expected to affect beneficial uses of the waters of the state as contained in the appropriate state water quality control plan.

Figure 2. California's Statewide Per Resident and Total Disposal from 2010 to 2021



The left y-axis represents million tons of disposal per year as shown by the bar graphs. The right y-axis represents the number of pounds of disposal per resident per day as shown by the black line. Data is from the RDRS with population from the California Department of Finance (5). Accessed September 2022.

In 2021, the commercial sector was the source of the most material disposed, followed by the residential and then self-haul sectors (see Table 1). About 48 percent of disposed material originated from the commercial sector. Compared to 2020, disposal decreased in both the commercial and residential sector.

Table 1. Source Sector Breakdown (%) by Year for Material Disposed in California from 2019 to 2021

Year	Self-Haul	Residential	Commercial
2019*	20%	30%	50%
2020	20%	33%	47%
2021	20%	32%	48%

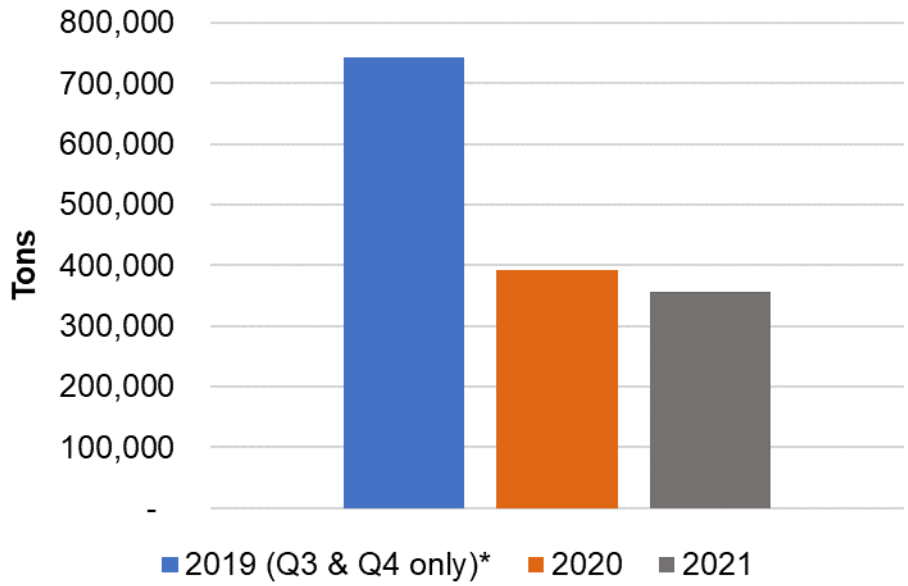
*Data on disposal by source sector is from the RDRS, which started being collected Quarter 3 (Q3) of 2019. *Data for 2019 is only for Q3 and Q4 of 2019. Accessed September 2022.*

Disposal-Related Activities

Disposal-related activities are included in total disposal to estimate the recycling rate. The six types of disposal-related activities in the state contributed to almost 10 percent of total disposal. ADC was the most prevalent, with 2.7 million tons used in 2021. Of the total ADC, about 360 thousand tons were green material ADC and the other 2.3 million tons were non-green material.

As per AB 1594 (Williams, Chapter 719, Statutes of 2014), beginning January 1, 2020, the use of green material ADC no longer counts as diversion and is considered disposal. Beginning in the third quarter of 2019, CalRecycle started collecting data through the RDRS on the use of green material ADC at landfills. Figure 3 compares the tons of green material ADC between 2019 (Q3 & Q4 only), 2020, and 2021 to illustrate the decreased use of green material ADC starting in 2020. The amount of green material used for ADC for half of 2019 was almost double the amount used for the entirety of 2020. In 2021, California landfills used even fewer tons of green material ADC than 2020, decreasing by about 33 thousand tons.

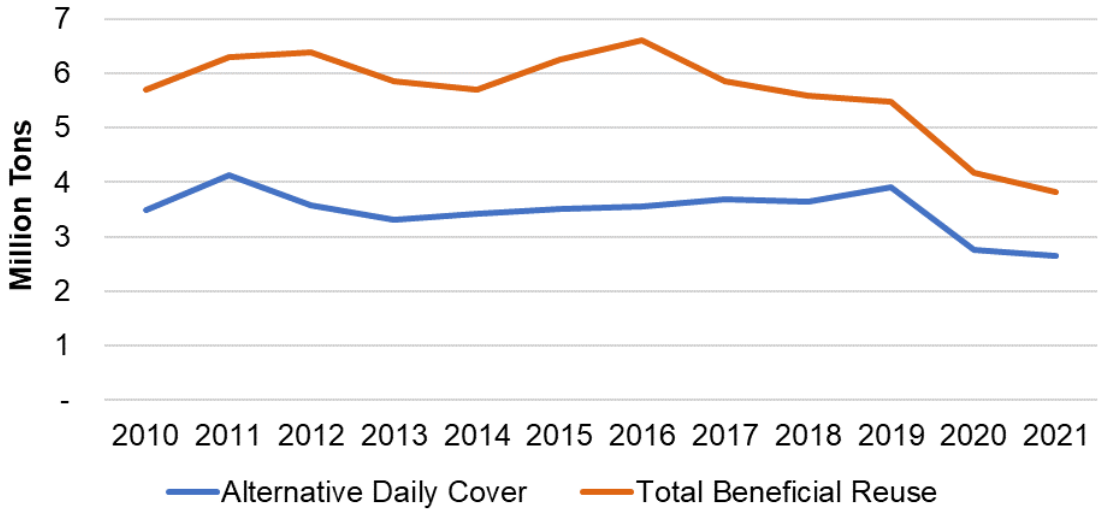
Figure 3. Green Material Alternative Daily Cover (ADC) Utilization from 2019* to 2021



*Data on green material ADC from the RDRS. Accessed September 2022. *Data for 2019 only includes Quarter 3 (Q3) and Quarter 4 because that information started being reported to the RDRS in Quarter 3 (Q3) of 2019.*

Largely due to the decrease in green material ADC, the amount of total material used for ADC (green and non-green) and total material used for beneficial reuse at California landfills has also decreased starting in 2020 (see Figure 4). Green material ADC is a subset of total ADC, a subset of total beneficial reuse.

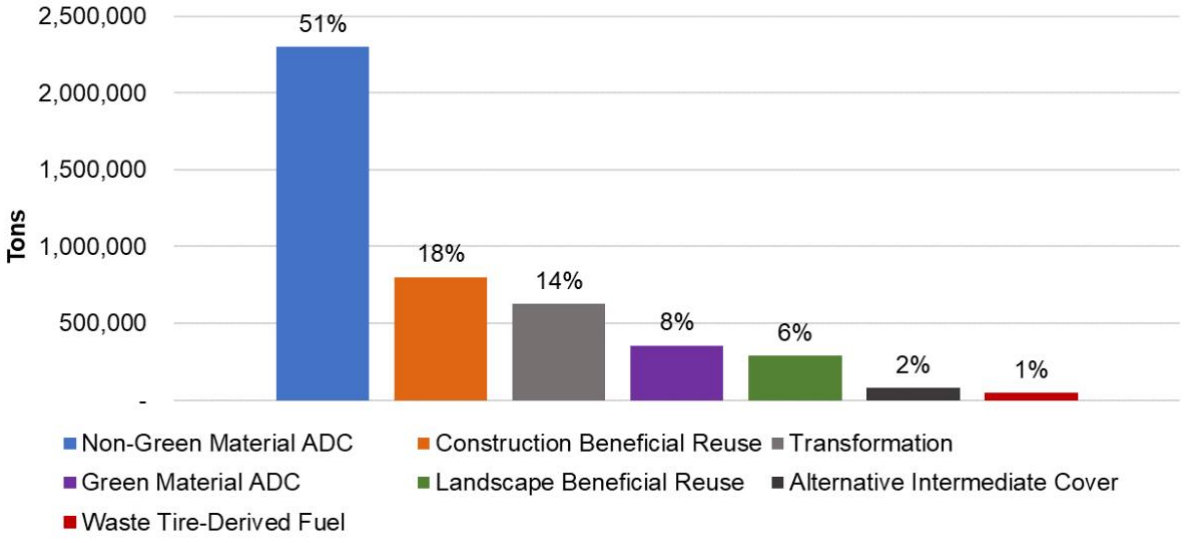
Figure 4. Total Beneficial Reuse and Total ADC from 2010 to 2021



Data on Beneficial Reuse is from the RDRS. Total ADC includes green and non-green material and is a subset of Total Beneficial Reuse. Accessed September 2022.

At landfills, operators used 1.2 million tons of material for beneficial reuse other than ADC, comprising 300 thousand tons for Landscaping and Erosion Control, around 800 thousand tons for construction, and about 80 thousand tons for AIC. In 2021, operators processed over 600 thousand tons of material at transformation facilities and around 50 thousand tons at waste tire-derived fuel facilities (see Figure 5).

Figure 5. Disposal-Related Tonnage in California in 2021

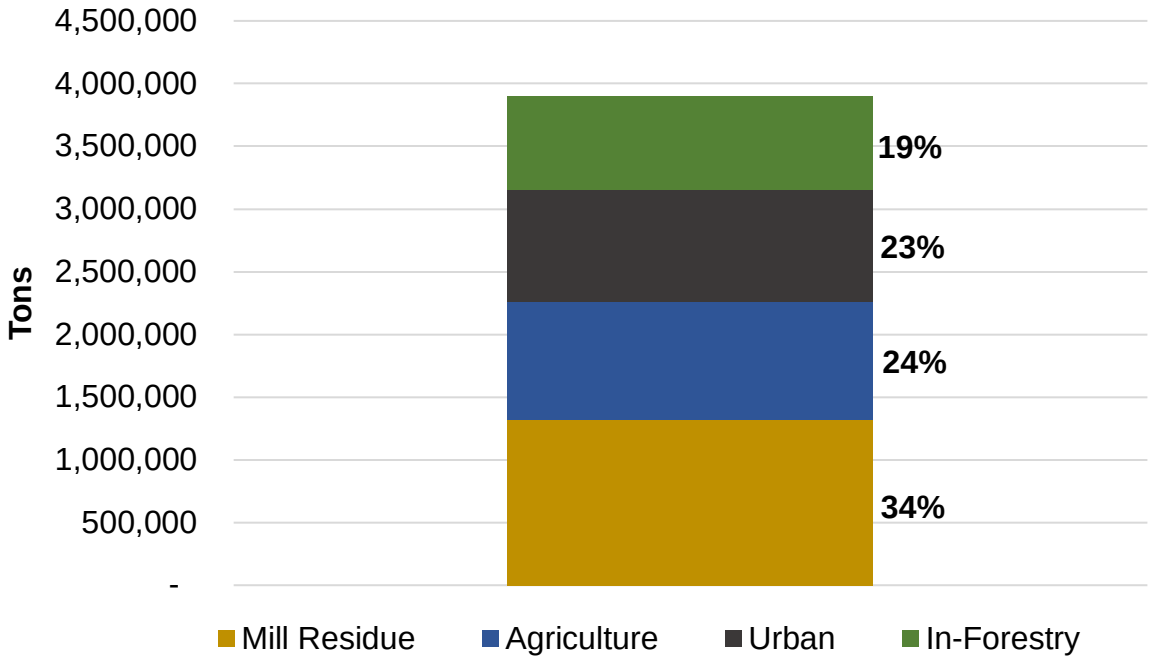


Data is from the RDRS (accessed September 2022) and waste tire-derived fuel reports submitted to CalRecycle [(1)]. No EMSW was reported in 2021.

Biomass

For the 2021 reporting year, 24 operating biomass conversion facilities submitted reports to CalRecycle. Collectively, these facilities accepted almost 4 million tons of woody biomass. Figure 6 shows roughly one-third of the wood waste originated from mill residue (about 1.3 million tons), slightly under a quarter originated from agricultural sources, and under a quarter originated from urban sources.

Figure 6. Source Sector for Woody Biomass Sent to Biomass Conversion Facilities in 2021



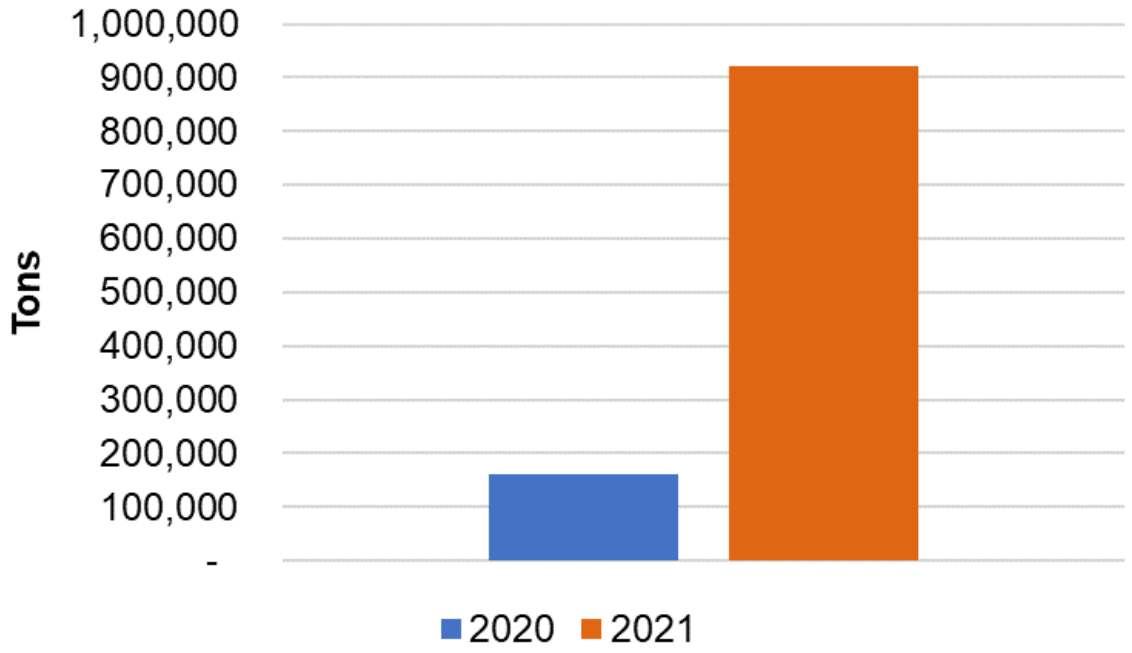
The y-axis represents the number of tons of biomass from contributing source sectors. Biomass conversion facilities reported data directly to CalRecycle pursuant to Public Resources Code Section 44107.

Disaster Debris

CalRecycle cleaned up nearly 1 million tons of disaster debris from wildfire disasters.

Based on data collected through the Recycling and Disposal Reporting System (RDRS), the total amount of disaster debris, including structural debris and hazard trees, disposed of in California totaled to over 900 thousand tons in 2021, up from less than 200,000 tons in 2020 (see Figure 7).

Figure 7. Trends in Disaster Debris Disposal in California Landfills from 2020 to 2021



Data is from the RDRS. Accessed September 2022.

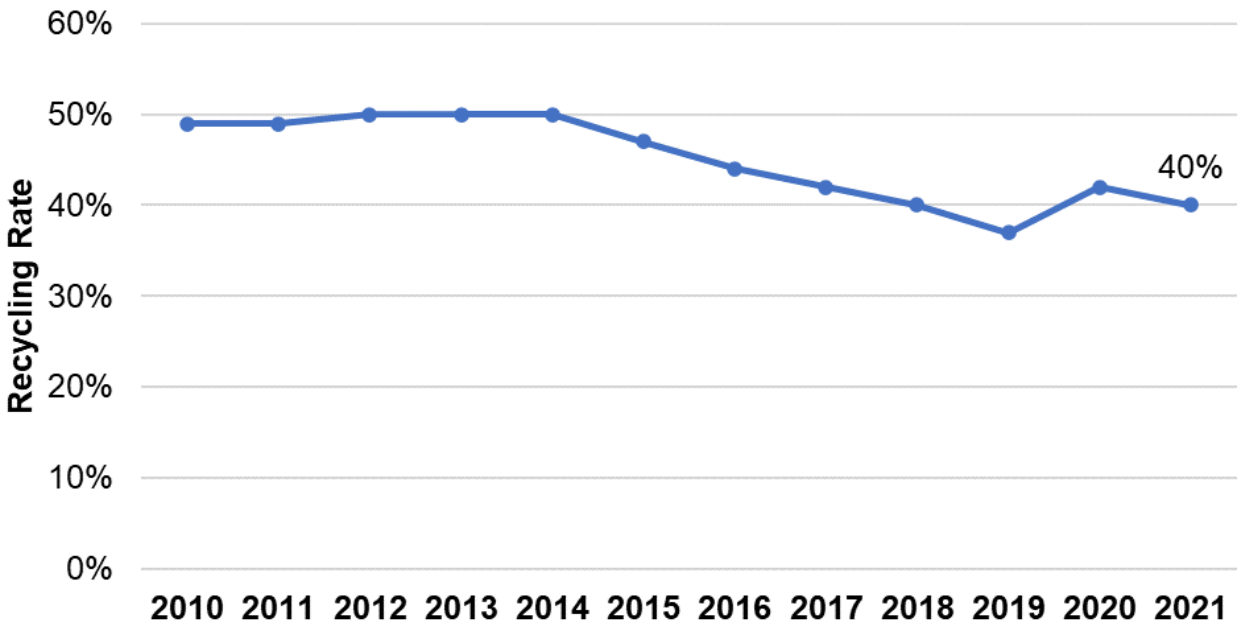
Statewide Recycling Rate

In 2021, California's recycling rate was 40%.

To calculate the statewide recycling rate to track progress towards the 75 percent recycling rate goal defined by AB 341 (Chesbro), CalRecycle subtracts the amount of material disposed in landfills and six disposal-related activities from the estimated total generation.

According to CalRecycle calculations and comparison with reported disposal, the department estimates that 30.7 million tons of material were recycled (through source reduction, recycling, and composting) in 2021. California's statewide recycling rate was 40 percent (see Figure 8).

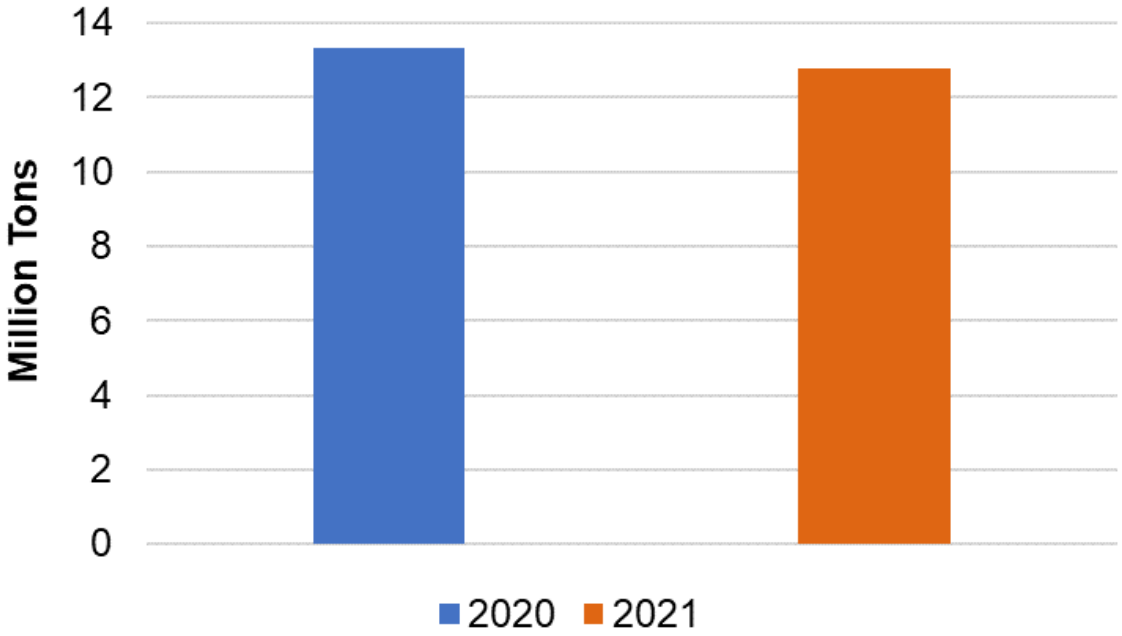
Figure 8. California's Statewide Recycling Rate Since 2010



End Use

In 2021, almost 13 million tons of recovered material was sent to end use from California. End use, a subset of materials estimated to be recycled, means that material was sent to a user that is a material consumer (compost and wood chips) or utilizes the recovered material for manufacturing and packaging, construction, fuel, or other use, including land application or inert debris fill. See Figure 9 for trends in end use outflows.

Figure 9. Trends in End Use Outflows in California in 2020 and 2021



Data is from the RDRS. Accessed September 2022.

Recyclable Materials Exports

After providing details on methods and data limitations, this section presents data on the number of recyclable materials exported via seaborne container vessels from California ports in 2021. Data on plastic scrap exports via truck and rail to Canada and Mexico is also presented. Data is displayed by country of import and specific material types (e.g., unsorted mixed paper). Additionally, appendices one and two contain more detailed information and data tables.

Methods & Data Limitations

The data on recyclable materials exports presented in this report come primarily from the World Institute for Strategic Economic Research (WISERTrade) Database unless otherwise noted(2). The most common mode of international export of recyclable materials from California is via seaborne container vessels. These vessels backhaul recyclable materials to countries in Asia and other parts of the world after delivering goods to American markets. WISERTrade also includes data on material exports by truck and rail and information regarding materials exported by air, although the latter is not a typical means for exporting recyclable materials from California. The following section presents data available for seaborne recyclable materials exports to all countries and truck and rail data specifically for plastic exports to Mexico and Canada.

WISERTrade includes data on all material exports from California ports. The Harmonized System (HS) code is an international standard that assigns numeric codes to traded commodities and is used to identify recyclable commodities from the database. To provide estimates, specific recyclable commodities were combined into custom groups to represent common recyclable categories by type or purpose (e.g., nonferrous metal). All weights shown are in short tons, equivalent to 2,000 pounds. WISERTrade also reports vessel value in U.S. dollars (USD) for seaborne exports‡. The data presented are for the calendar year 2021 and were accessed in February and March 2022.

One of the leading data limitations of this report is that material is reported by port of export (by state) rather than by origin of material exported. Ports in other states may export materials that were generated in California, and materials generated out of state can also be exported via California ports. Materials may also be transported out of the state by truck and rail. The data presented in this section do not account for these factors, except for data presented on plastic exports to Canada and Mexico via truck and rail.

‡The “vessel value”, or the free alongside ship value, is the value of exports at the U.S. seaport, airport, or border port of export, based on the transaction price, including inland freight, insurance, and other charges incurred in placing the merchandise alongside the carrier at the U.S. port of exportation. The value, as defined, excludes the cost of loading the merchandise aboard the exporting any charges or transportation costs beyond the port of exportation.

Table 2. Examples of Material Types Found in Each Recyclable Material Category

Recyclable Material Category	Material Types in Category
Batteries	waste and scrap of batteries and electric storage batteries
Chemical Pulp	other paper made mainly of bleached chemical pulp
Copper Wire	copper wire waste and scrap
Ferrous Metal	ferrous metal waste and scrap including steel and iron
Glass	cullet and other waste scrap glass
High-grade Paper	office paper scrap, deinked waste paper, and paperboard
Mechanical Pulp	other paper made mainly of mechanically separated pulp
Mixed Plastics 3-7	resin types: polymers of vinyl (PV), polystyrene (PS), other plastic not PET
Nonferrous Metal	aluminum cans, brass, copper (excluding copper wire), zinc, tin, tungsten, and other metals, waste, and scrap
OCC and Kraft Paper	old corrugated cardboard (OCC), brown paperboard, kraft paper
Other Miscellaneous Mixed Paper	mechanical pulp paper, chemical pulp paper, newsprint
Plastics 1-2	resin types: polyethylene, polyethylene terephthalate (PET), PET scrap
Tire and Rubber Scrap	waste parings and scraps of rubber, and retreads of tires
Unsorted Mixed Paper	unsorted scrap of paper and paperboard
Used Oil and Grease	waste oils made of polychlorinated biphenyls (PCBs), and other grease and light oils
Worn Clothing	worn clothing and other worn items, and rags

Total Seaborne Recyclable Materials Exports

Based on the 2021 WISERTrade data, 12.2 million tons of recyclable materials were exported from California ports to international markets. Compared to 2020, the tonnage decreased 9% in 2021 by over one million tons (see Figure 10).

Recyclable materials exported from California ports had a vessel value of about $5.9 billion USD (see Figure 11). Inconsistent with the reduction in tonnage exported, the total vessel value increased by about $1.4 billion USD compared to 2020.

Recyclable materials accounted for 22 percent of the 55.8 million tons of all material exported from California.

Figure 10. Seaborne Recyclable Materials Exports from California from 2011 to 2021, by Weight

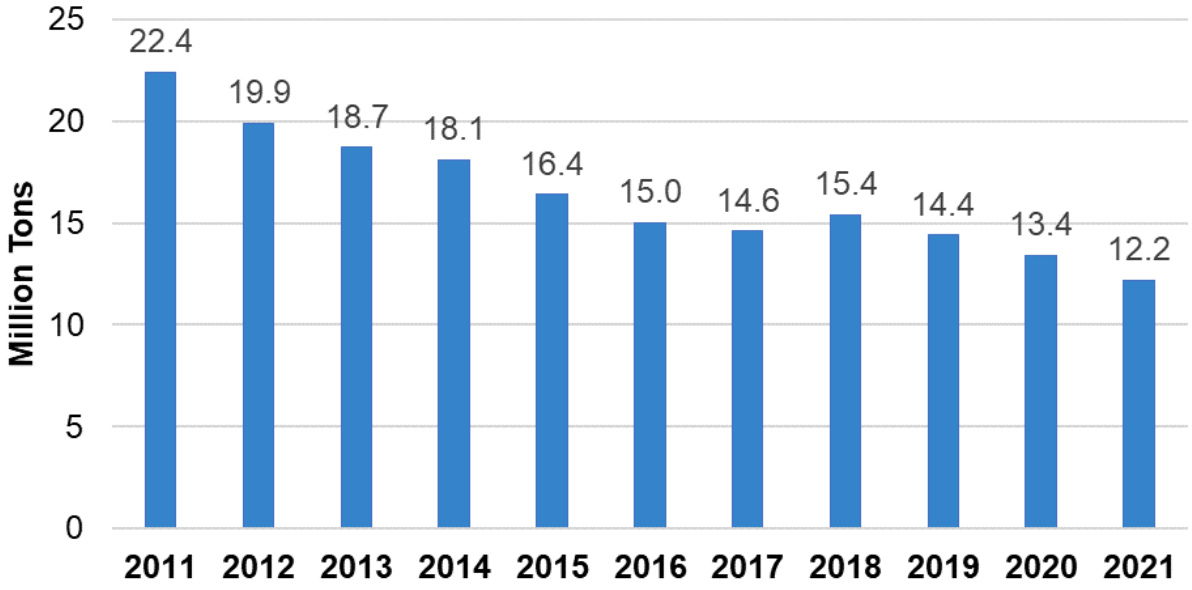
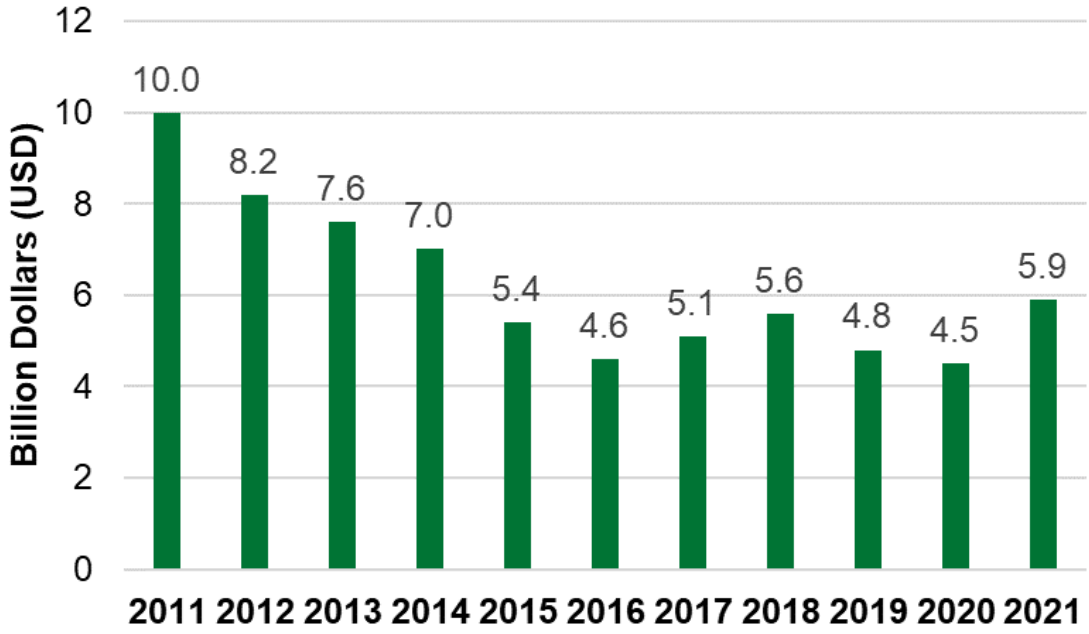


Figure 11. Seaborne Recyclable Materials Exports from California from 2011 to 2021, by Vessel Value



Tables 3 and 4 summarize the recyclable materials exported from California seaports in 2021.

Table 3 provides the weight (tons) of seaborne recyclable materials exported by material category in 2020 and 2021, including the percent change in weight from 2020 to 2021.

Table 3. Seaborne Recyclable Materials Exports from California for 2020 and 2021, by Weight

Material Category	2020 Tons	2021 Tons	Tonnage Change (Tons)	Percent Change
OCC and Kraft Paper	4,976,543	5,317,384	340,841	7%
Ferrous Metal	5,228,707	4,574,282	-654,425	-13%
Non-Ferrous Metal	920,238	965,201	44,963	5%
Unsorted Mixed Paper	368,445	471,226	102,781	28%
Other Misc. Paper	1,463,159	466,094	-997,065	-68%
High Grade Paper	76,687	115,259	38,572	50%
Worn Clothing	103,678	113,923	10,245	10%
Plastics 1 and 2	111,777	81,533	-30,244	-27%
Mixed Plastics 3-7	48,510	16,754	-31,756	-65%
Used Oil and Grease	14,989	16,402	1,413	9%
Tires/Rubber	14,427	6,954	-7,473	-52%
Batteries	20,273	4,796	-15,477	-76%
Glass	1,837	1,636	-201	-11%
Total All Recyclable Material*	13,401,551	12,186,889	-1,214,662	-9%
Total All Exports (Recyclable and Not)	58,001,327	55,796,591	-2,204,736	-4%

**The total of all seaborne recyclable materials exports includes material types not included in the selected material categories listed in the table.*

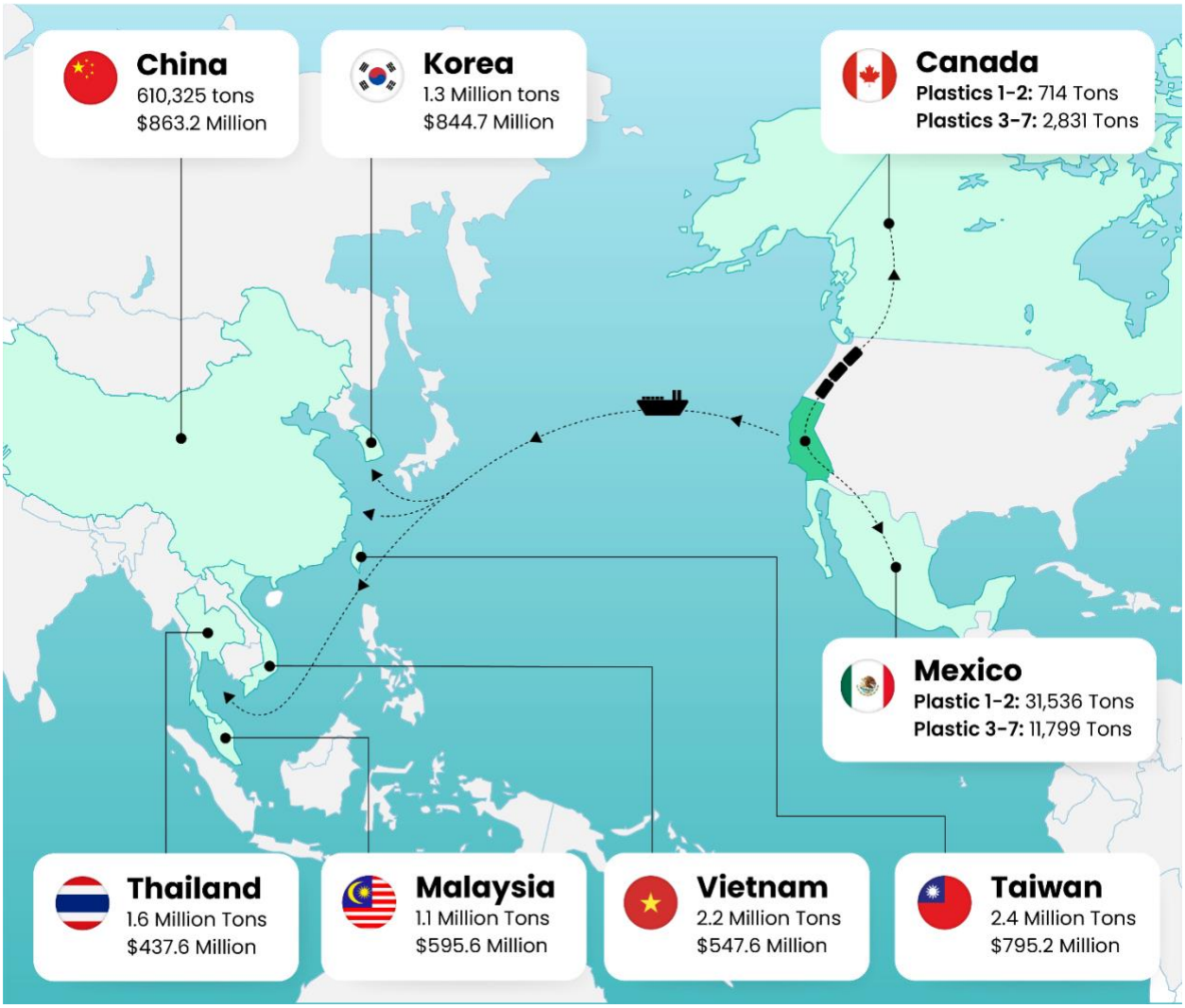
Table 4 provides the vessel value (USD) of recyclable materials exported by material category in 2020 and 2021, including the percent change in vessel value from 2020 to 2021.

Table 4. Seaborne Recyclable Materials Exports from California for 2020 and 2021, by Vessel Value

Material Category	2020 Vessel Value (USD)	2021 Vessel Value (USD)	Vessel Value Change (USD)	Percent Change
Non-Ferrous Metal	1,619,741,207	2,539,298,543	919,557,336	57%
Ferrous Metal	1,400,092,762	1,857,730,214	457,637,452	33%
OCC and Kraft Paper	721,776,615	908,978,174	187,201,559	26%
Worn Clothing	84,986,965	126,686,618	41,699,653	49%
Other Misc. Paper	258,491,800	100,863,699	-157,628,101	-61%
Unsorted Mixed Paper	48,522,510	74,930,808	26,408,298	54%
Plastics 1 and 2	32,539,978	35,567,595	3,027,617	9%
High Grade Paper	18,642,104	33,423,752	14,781,648	79%
Glass	28,132,009	30,176,966	2,044,957	7%
Batteries	28,373,023	7,907,150	-20,465,873	-72%
Mixed Plastics 3-7	11,069,642	5,923,086	-5,146,556	-46%
Used Oil and Grease	3,558,470	3,718,823	160,353	5%
Tires/Rubber	14,547,749	2,796,087	-11,751,662	-81%
Total All Recyclable Material*	4,443,532,329	5,890,377,803	1,446,845,474	33%
Total All Exports (Recyclable and Not)	85,579,834,256	81,789,190,995	-3,790,643,261	-4%

**The total of all seaborne recyclable materials exports includes material types not included in the selected material categories listed in the table.*

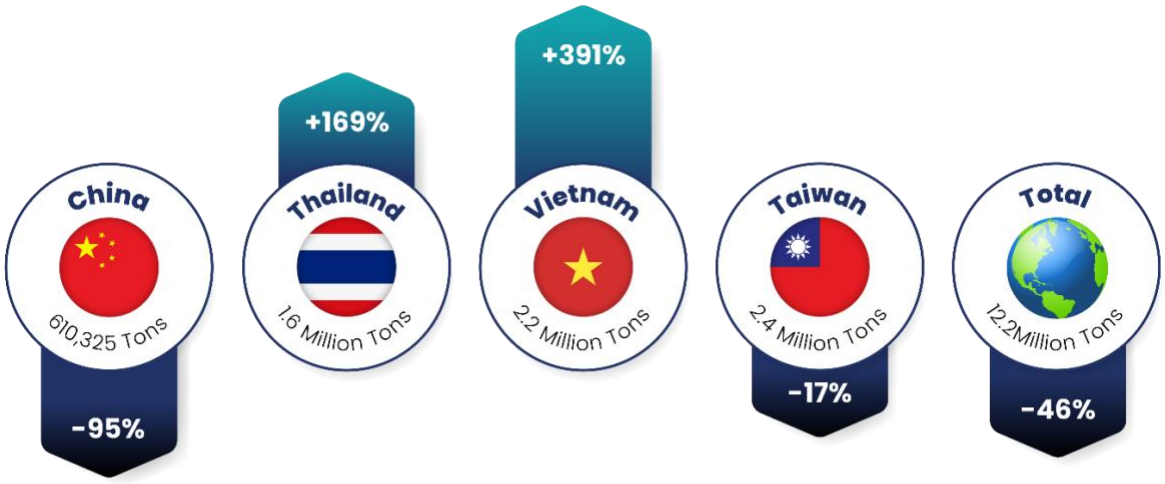
Country of Import



California's seaborne recyclable materials exports to top importing countries in 2021, plus plastics sent via truck and rail to Canada and Mexico.

The three countries importing the most recyclable materials from California in 2021 were, in order of greatest tonnage: Taiwan, Vietnam, and Thailand (see Figure 12). Taiwan's, Vietnam's, and Thailand's total recyclable imports increased by weight in 2021 compared to 2020.

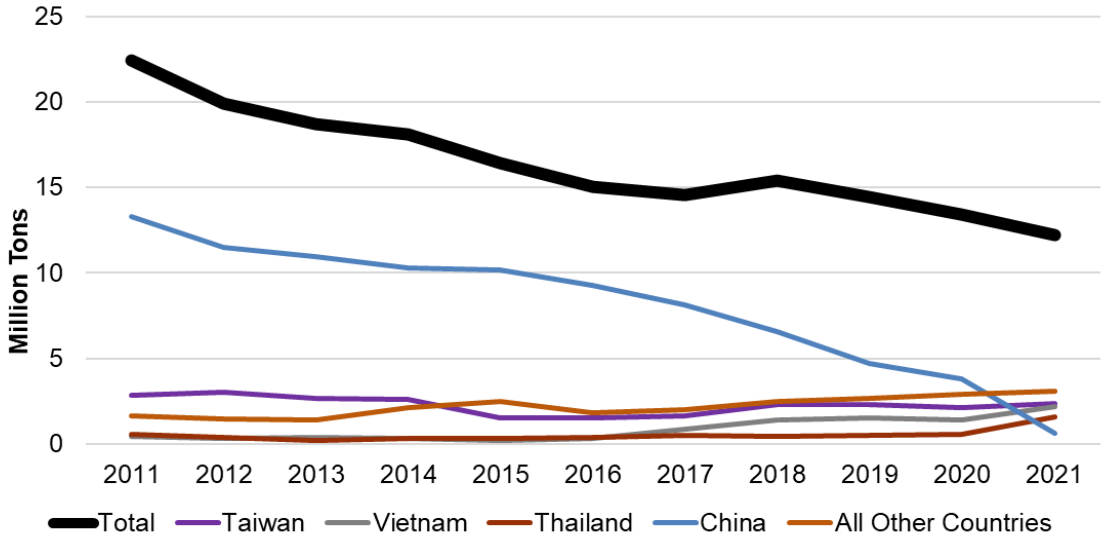
From 2000 to 2020, China was the largest importer of California's recyclable materials. In 2021, China fell to the seventh largest importer. The amount of recyclable materials imported by China has steadily decreased since 2011. In 2021, China imported 5 percent of all seaborne recyclable materials by weight and 15 percent by vessel value compared to 2011.



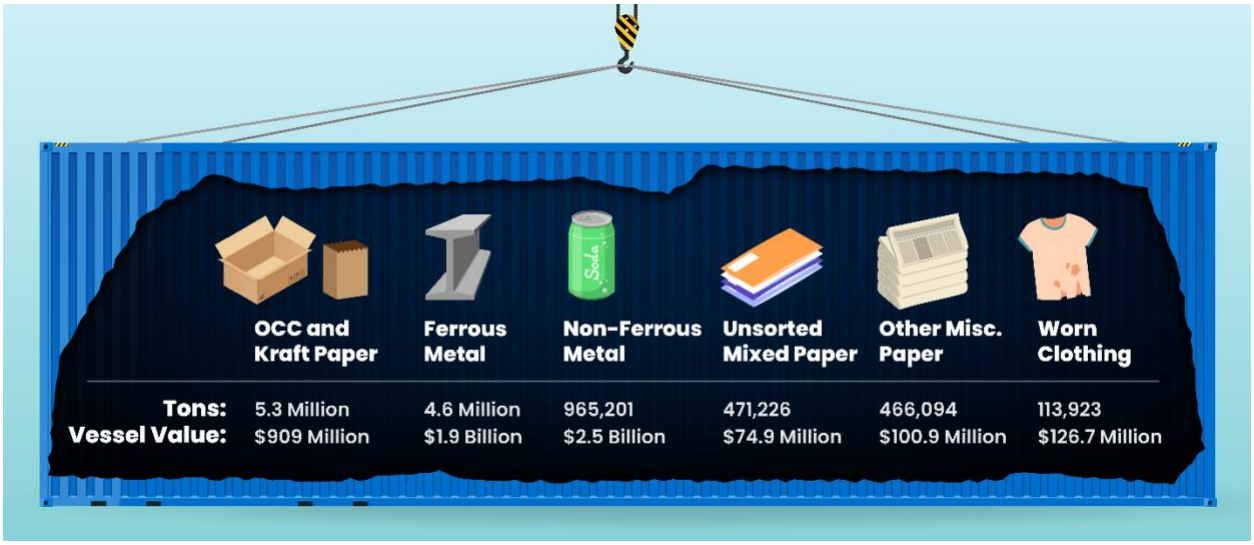
Change in seaborne imports of recyclable materials from California between 2011 and 2021.

The line graphs below that show seaborne exports by country, including the figure below, include the top three importing countries for the given recyclable material, plus China. “All Other Countries” are materials imported by all other countries. “Total” is the sum of seaborne exports from all countries, including the top 3 and China.

Figure 12. Seaborne Recyclable Materials Exports from California by Country of Import from 2011 to 2021, by Weight



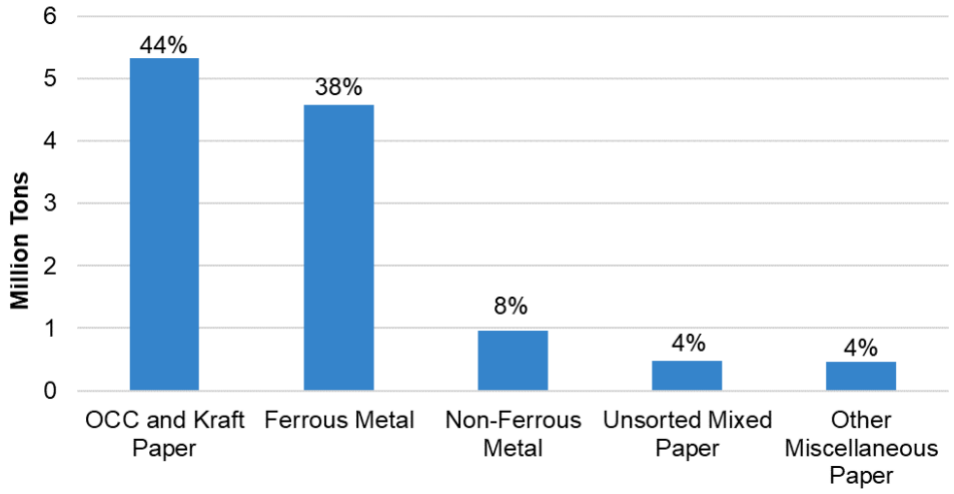
Material Type



Top recyclable material categories exported in 2021 from California by tons and vessel value.

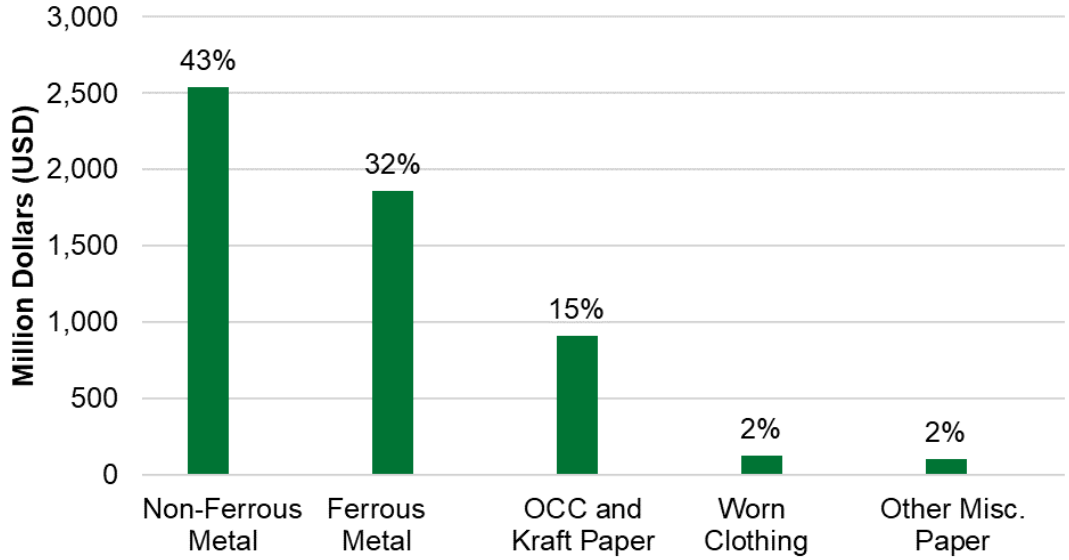
The five recyclable material categories with the most weight exported from California in 2021 were OCC and Kraft Paper, Ferrous Metal, Non-Ferrous Metal, Unsorted Mixed Paper, and Other Miscellaneous Paper (see Figure 13). The five greatest exported recyclable material types by vessel value were: Non-Ferrous Metal, Ferrous Metal, OCC and Kraft Paper, Worn Clothing, and Other Miscellaneous Paper (see Figure 14).

Figure 13. Top Five Exported Recyclable Materials from California in 2021, by Weight



Information presented in terms of million tons and percent of total seaborne recyclable materials exports (12.2 million tons in 2021). The figure only includes the top five exported recyclable materials, thus does not sum to 100 percent.

Figure 14. Top Five Exported Recyclable Materials from California in 2021, by Vessel Value



Information presented in terms of million USD and percent of total seaborne recyclable materials exports ($5.9 billion USD in 2021). The figure only includes the top five exported recyclable materials and thus does not sum to 100 percent.

Ferrous Metals

Recyclable materials exports of Ferrous Metals decreased from about 5.2 million tons in 2020 to about 4.6 million tons in 2021 (see Figure 15). The vessel value increased from $1.4 billion to $1.9 billion USD in 2021 (see Figure 16).

Figure 15. Seaborne Exports of Ferrous Metals from California by Country of Import from 2011 to 2021, by Weight

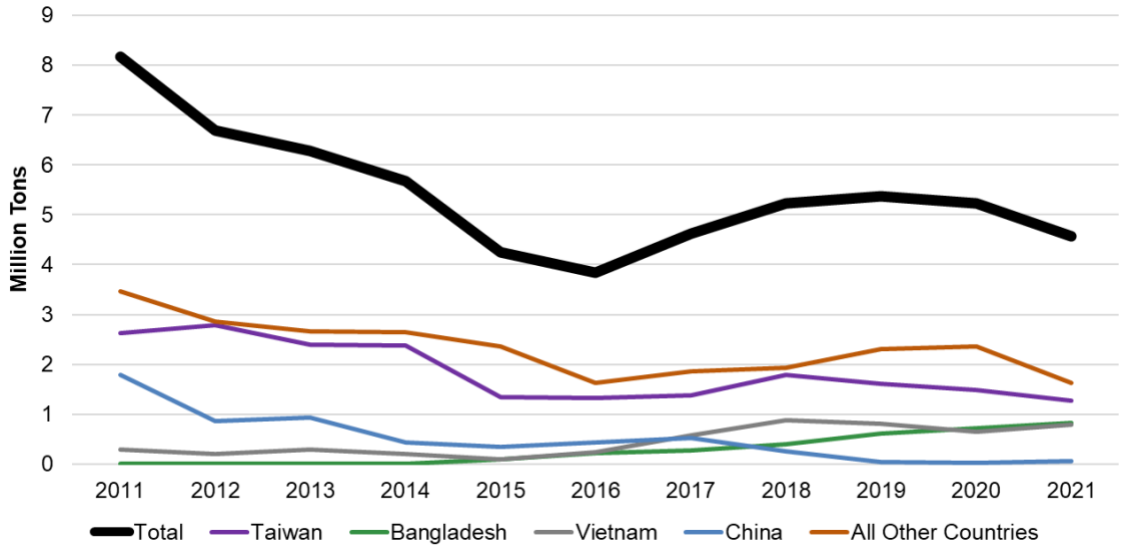
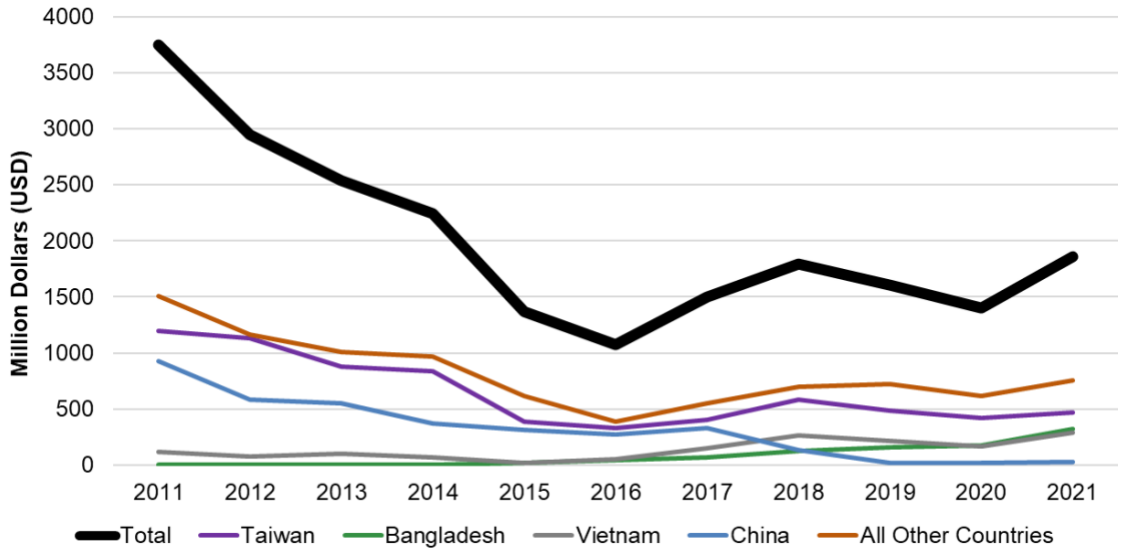


Figure 16. Seaborne Exports of Ferrous Metals from California by Country of Import from 2011 to 2021, by Vessel Value



Old Corrugated Cardboard (OCC) and Kraft Paper

Recyclable materials exports of OCC and Kraft paper increased from about 5.0 million tons in 2020 to about 5.3 million tons in 2021 (see Figure 17). The vessel value also increased from $722 million in 2020 to $909 million USD in 2021 (see Figure 18).

Figure 17. Seaborne Exports of OCC and Kraft Paper from California by Country of Import from 2011 to 2021, by Weight

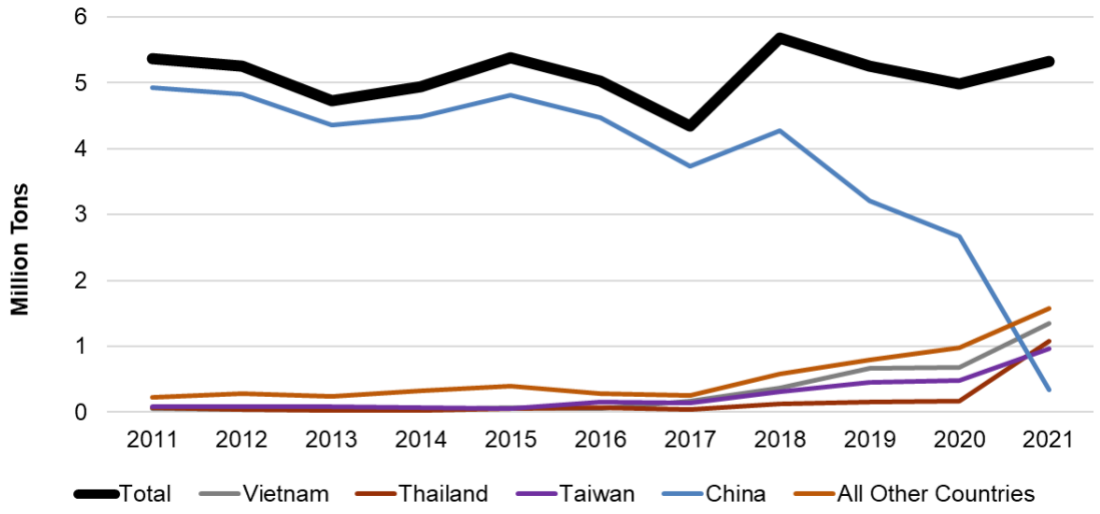
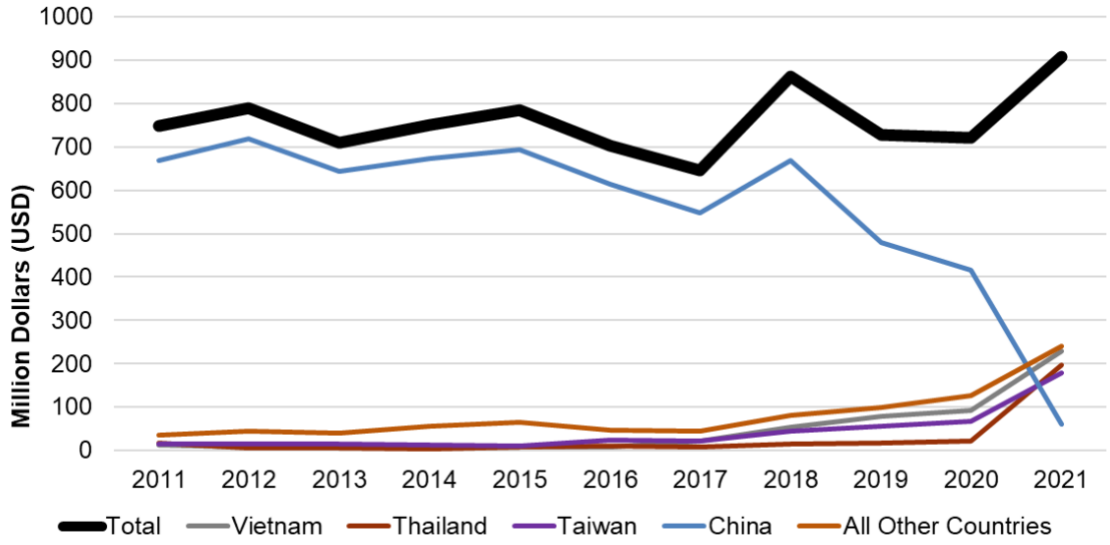


Figure 18. Seaborne Exports of OCC and Kraft Paper from California by Country of Import from 2011 to 2021, by Vessel Value



Plastics 1 and 2

Seaborne recyclable materials exports of Plastics 1 and 2 decreased from about 112 thousand tons in 2020 to about 82 thousand tons in 2021 (see Figure 19). Despite the decrease in total tons exported, the vessel value increased from about $33 million in 2020 to about $36 million USD in 2021 (see Figure 20).

Figure 19. Seaborne Exports of Plastics 1 and 2 from California by Country of Import from 2011 to 2021, by Weight

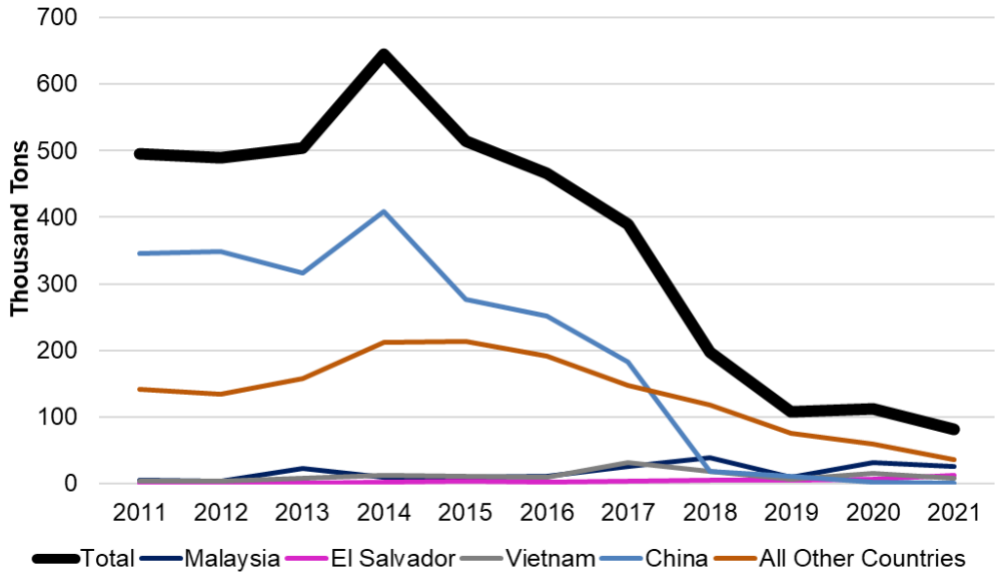
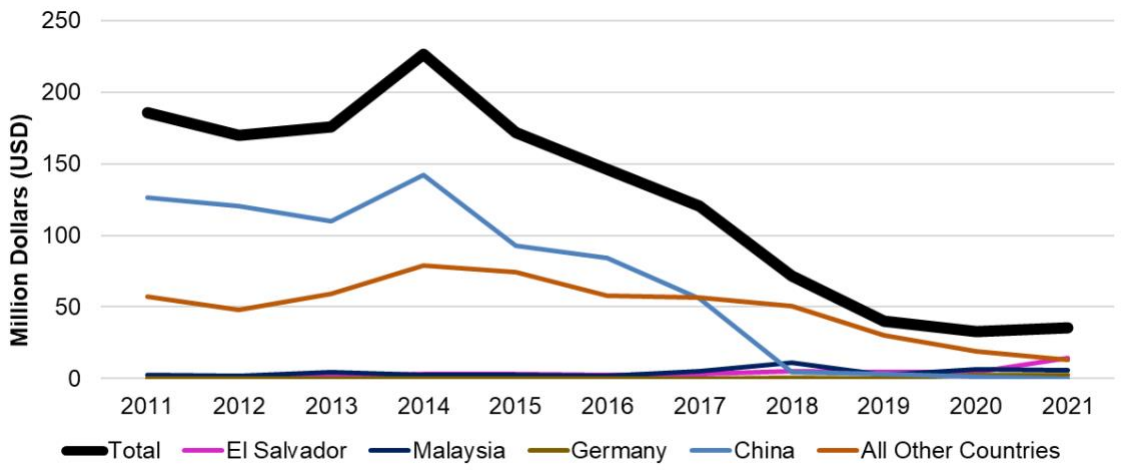
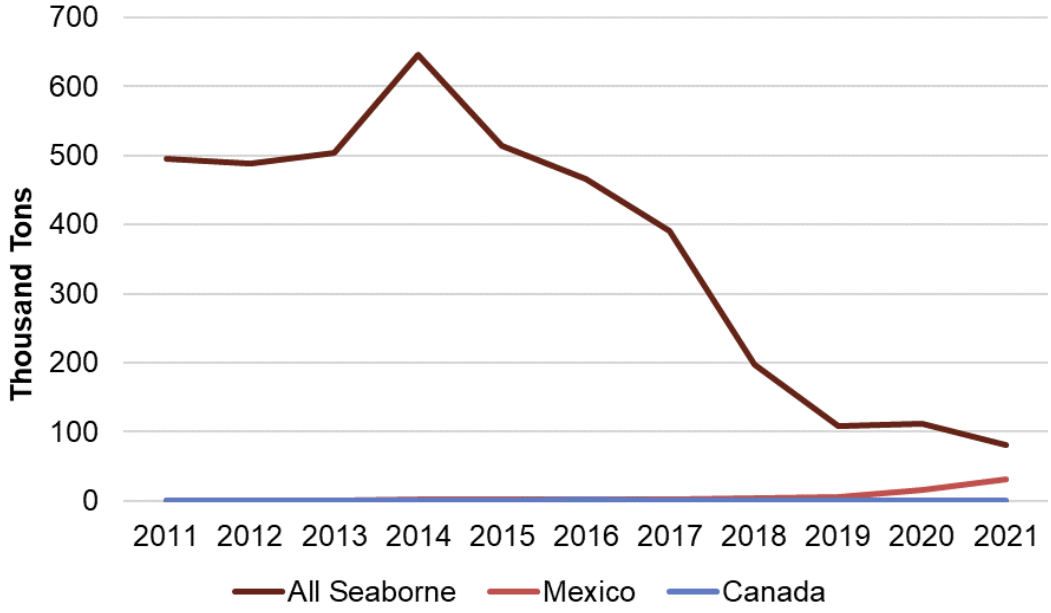


Figure 20. Seaborne Exports of Plastics 1 and 2 from California by Country of Import from 2011 to 2021, by Vessel Value



For the first time in this report, CalRecycle estimated Plastics 1 and 2 going to Mexico and Canada via truck and rail in addition to seaborne exports (see Figure 21). Historically, seaborne exports of scrap plastics 1 and 2 were much larger than those sent via truck and rail. In recent years, given significant decreases in seaborne exports and an increase in plastics sent to Mexico, the proportion of Plastics 1 and 2 sent to Mexico has increased, representing about 28 percent of all exports of scrap plastics 1 and 2 from California. This makes Mexico the largest overall importer (seaborne, truck, and rail) of this material from California.

Figure 21. Seaborne Exports and Truck & Rail Exports to Canada and Mexico of Plastic 1 and 2 from California from 2011 to 2021, by Weight



Mixed Plastics 3 through 7

Seaborne recyclable materials exports of Mixed Plastics 3 through 7 decreased from about 49 thousand tons in 2020 to about 17 thousand tons in 2021 (see Figure 22). The vessel value decreased from about $11 million in 2020 to $6 million USD in 2021 (see Figure 23).

Mexico is the largest importer of Plastics 3-7 from California

Figure 22. Seaborne Exports of Mixed Plastics 3 through 7 from California by Country of Import from 2011 to 2021, by Weight

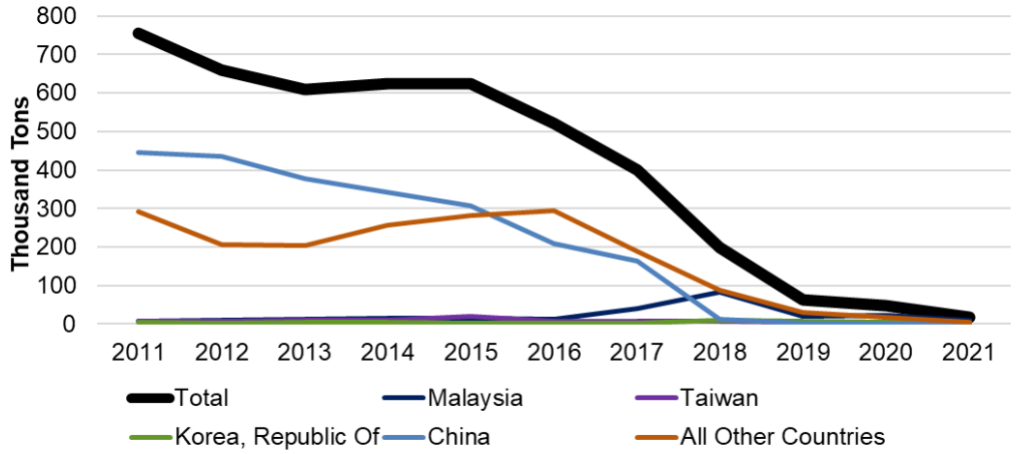
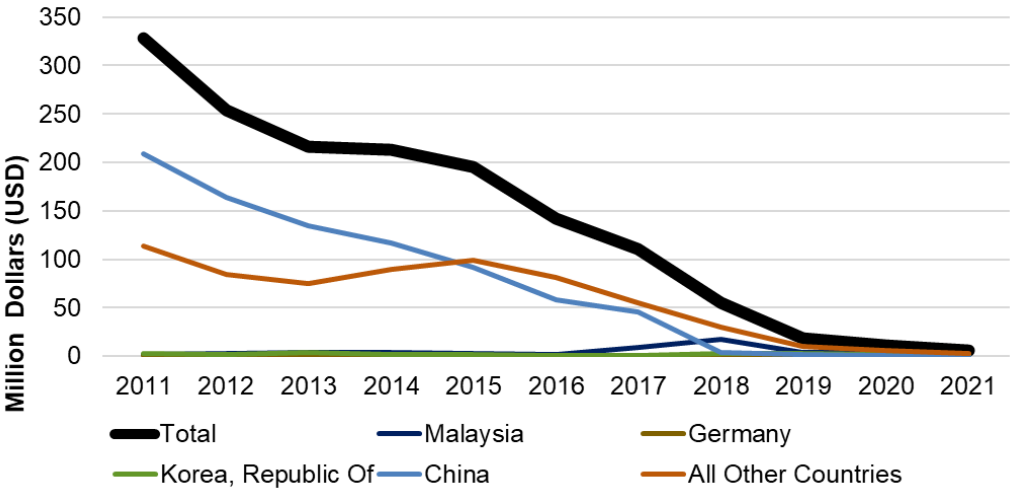
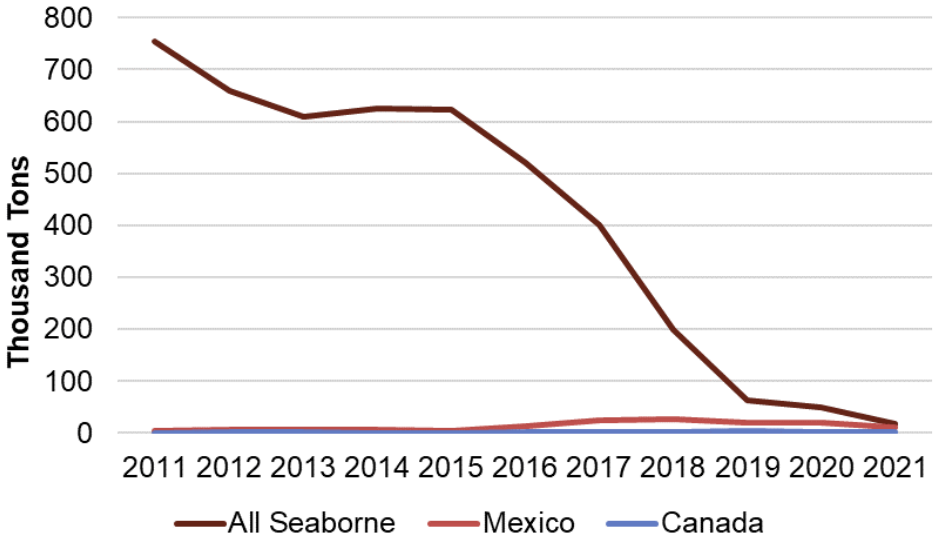


Figure 23. Seaborne Exports of Mixed Plastics 3 through 7 from California by Country of Import from 2011 to 2021, by Vessel Value



For the first time in this report, CalRecycle estimated scrap Plastics 3 through 7 going to Mexico and Canada via truck and rail, in addition to seaborne exports (see Figure 24). Historically, seaborne exports of scrap plastics 3 through 7 were much larger than those sent via truck and rail. In recent years, given significant decreases in seaborne exports, the proportion of Plastics 3 through 7 sent to Mexico has increased, representing about 38 percent of all exports of scrap plastics 3 through 7 from California. This also makes Mexico the largest overall importer (seaborne, truck, and rail) of this material from California.

Figure 24. Seaborne Exports and Truck & Rail Exports to Canada and Mexico of Mixed Plastics 3 through 7 from California from 2011 to 2021, by Weight



Non-Ferrous Metals

Recyclable materials exports of Non-Ferrous Metals increased from about 920 thousand tons in 2020 to about 965 thousand tons in 2021 (see Figure 25). The vessel value also increased from about $1.6 billion in 2020 to $2.5 billion in 2021 (see Figure 26).

Figure 25. Seaborne Exports of Non-Ferrous Metals from California by Country of Import from 2011 to 2021, by Weight

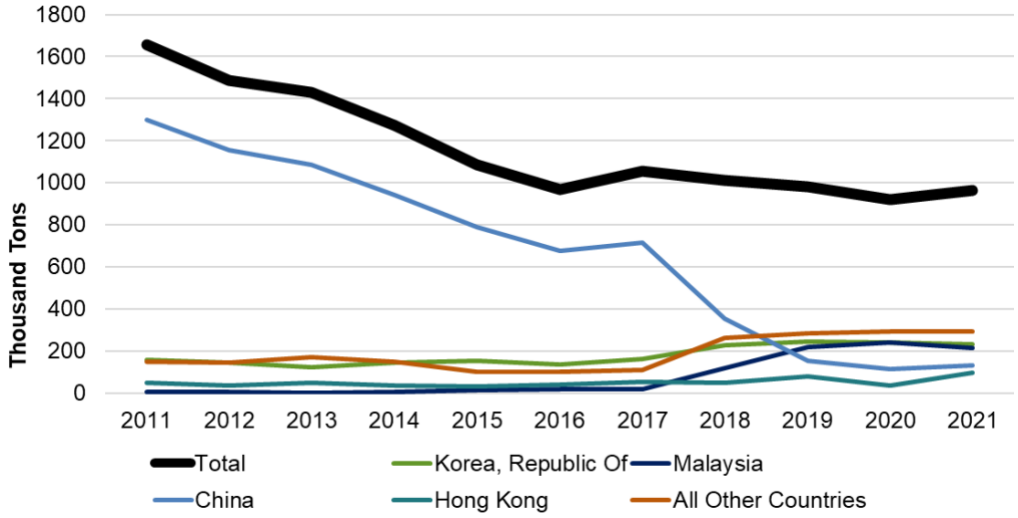
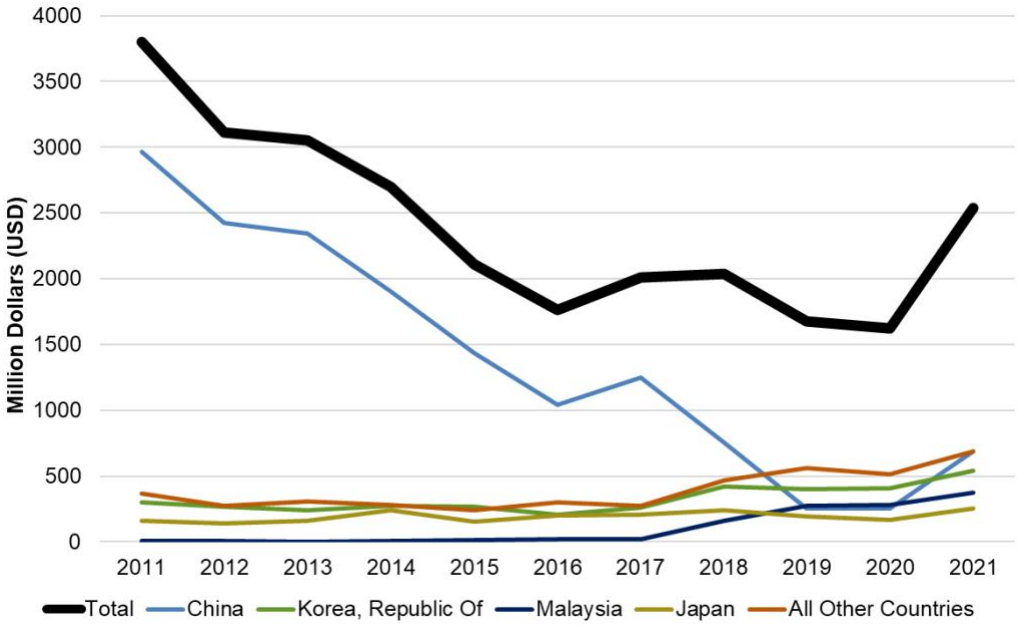


Figure 26. Seaborne Exports of Non-Ferrous Metals from California by Country of Import from 2011 to 2021, by Vessel Value



Conclusion

California has clear and ambitious environmental goals for reducing waste and managing materials. In 2021, California's recycling rate was 40 percent, down from 42 percent in 2020.

CalRecycle will continue to monitor the state's progress through a robust mix of research and reporting. As California builds a circular economy, we will use the information gained to make necessary and scientifically sound course corrections and innovations to protect California's resource s, climate, and communities.

California continues to strive towards its ambitious environmental goals. To learn more about how you can reduce, reuse, and recycle, visit irecyclesmart.com

Appendix 1: Table Data for Figures in the Report

Figure 1 Data Table. Estimated Management of 76.7 Million Tons of Materials Generated in California in 2021

The figure displays tonnage estimates for how the 76.7 million tons of materials generated in California in 2021 were managed, including a percent of total generation for each.

Management Option	Tons	Percent of Total Generation
Landfill	41,522,329	54%
Exported Recyclables (Seaborne)	12,186,889	16%
Compost/Anaerobic Digestion/Mulch	9,522,164	12%
Source Reduction & Recycling	9,018,427	12%
ADC Non-Green Material	2,299,696	3%
Beneficial Reuse- Construction	801,733	1%
Transformation	625,708	1%
ADC Green Material	356,463	<1%
Beneficial Reuse- Landscaping	289,187	<1%
Alternative Intermediate Cover	78,443	<1%
Waste-Tire Derived Fuel	48,200	<1%
Engineered Municipal Solid Waste	0	0%

CalRecycle derived quantities of landfilled waste, transformation, ADC, AIC, EMSW, and other beneficial reuse from RDRS. Accessed September 2022. No EMSW was reported in 2021. CalRecycle calculated waste tire-derived fuel based on data reported to CalRecycle [(1)]. CalRecycle collected exported recyclables data from WISERTrade. [(2).] Accessed February and March 2022. CalRecycle collected estimates for materials composted, anaerobically digested, and mulched based on published reports [(3; 4)]

Figure 2 Data Table. California's Statewide Per Resident and Total Disposal from 2010 to 2021

The bar chart in this figure displays tons of landfill disposal and disposal-related activities from 2010 to 2021. The scatter plot displays the per resident total disposal rate, including disposal and disposal-related activities, in terms of pounds per resident per year.

Year	Landfill Disposal (Tons)	Disposal-Related Activities (Tons)	Per Resident Disposal (pounds per resident per year)
2010	30,403,163	6,627,901	5.4
2011	29,890,010	7,176,418	5.4
2012	29,268,861	7,292,221	5.3
2013	30,182,493	6,799,744	5.3
2014	31,195,061	6,611,871	5.4
2015	33,241,828	7,150,561	5.7
2016	35,197,922	7,495,276	6.0
2017	37,810,918	6,654,730	6.2
2018	39,918,872	6,336,633	6.4
2019	42,246,199	6,328,547	6.7
2020	39,970,881	4,879,427	6.2
2021	41,522,329	4,450,999	6.4

Data is from the RDRS with population from the California Department of Finance [(5)]*.*

Accessed September 2022.

Figure 3 Data Table. Green Material ADC Utilization from 2019-2021

This figure displays the total tons of green material alternative daily cover (ADC) that was utilized from 2019 (quarters 3 and 4 only) to 2021.

Year	Tons of Green Material ADC Utilized
2019*	743,749
2020	391,592
2021	356,463

***** Q3 and Q4 tons only

Figure 4 Data Table. Total Beneficial Reuse and Total ADC from 2010 to 2021

The figure displays the total tons of beneficial reuse and tons of alternative daily cover utilized in California from 2010 to 2021.

Year	Alternative Daily Cover Tons	Total Beneficial Reuse Tons
2010	3,487,779	5,695,677
2011	4,137,698	6,292,689
2012	3,572,987	6,395,662
2013	3,301,578	5,862,152
2014	3,420,540	5,710,258
2015	3,516,961	6,252,437
2016	3,547,840	6,611,553
2017	3,691,523	5,860,901
2018	3,633,057	5,579,375
2019	3,901,56	5,490,166
2020	2,761,676	4,165,567
2021	2,656,159	3,827,091

Figure 5 Data Table. Disposal-Related Tonnage in California in 2021

The figure displays tons of material managed in disposal-related activities, which totaled 4.5 million tons in California in 2021. Figure 1 also displays the percent of all disposal-related activities for each activity type.

Disposal-Related Activity	Tons	Percent of Total
Non-Green Material ADC	2,299,696	51%
Construction Beneficial Reuse	801,733	18%
Transformation	625,708	14%
Green Material ADC	356,463	8%
Landscape Beneficial Reuse	290,756	6%
Alternative Intermediate Cover	78,443	2%
Waste Tire-Derived Fuel	48,200	1%
Engineered Municipal Solid Waste	0	0%

Data is from the RDRS (accessed September 2022) and waste tire-derived fuel reports submitted to CalRecycle (1)

Figure 6 Data Table. Source Sector for Woody Biomass Sent to Biomass Conversion Facilities in 2021
This figure displays the tons of woody biomass accepted in California in 2021 by material source.

Material Source	Tons Accepted	Percent of Total
Mill Residue	1,317,360	34%
Agriculture	944,432	24%
Urban	888,222	23%
In-Forestry	748,946	19%

Biomass conversion facilities reported data directly to CalRecycle pursuant to Public Resources Code Section 44107.

Figure 7 Data Table. Trends in Disaster Debris Disposal in California Landfills in 2021
The figure displays the tons of disaster debris that was disposed in landfills in California from 2020- 2021.

Quarter	Tons of Disaster Debris Disposed
2020	161,270
2021	921,385

Figure 8 Data Table. California's Statewide Recycling Rate Since 2010
This figure displays the percent recycling rate in California from 2010 to 2021.

Year	Recycling Rate
2010	49%
2011	49%
2012	50%
2013	50%
2014	50%
2015	47%
2016	44%
2017	42%
2018	40%
2019	37%
2020	42%
2021	40%

Figure 9 Data Table. Trends in End Use Outflows in California from 2020-2021
This figure displays tons of material sent as end use outflows in 2020 and 2021 in California.

Quarter	Tons Sent
2020	13,323,987
2021	12,756,696

Figure 10 Data Table. Seaborne Recyclable Materials Exports from California from 2011 to 2021, by Weight

This figure displays the tons of recyclable materials shipped from California ports by sea from 2011 to 2021.

Year	Recyclable Materials Exports (Tons)
2011	22,421,235
2012	19,898,077
2013	18,720,575
2014	18,093,880
2015	16,425,428
2016	15,004,668
2017	14,563,494
2018	15,419,559
2019	14,442,427
2020	13,401,551
2021	12,186,889

Figure 11 Data Table. Seaborne Recyclable Materials Exports from California from 2011 to 2021, by Vessel Value

This figure displays the vessel value (USD) of recyclable materials shipped from California ports by sea from 2011 to 2021.

Year	Recyclable Materials Exports Vessel Value (USD)
2011	$10,028,140,634
2012	$8,237,767,017
2013	$7,605,086,054
2014	$6,970,882,999
2015	$5,386,926,247
2016	$4,571,461,619
2017	$5,119,174,368
2018	$5,594,550,006
2019	$4,818,959,679
2020	$4,443,532,329
2021	$5,890,377,803

Figure 12 Data Table. Seaborne Recyclable Materials Exports from California by Country of Import from 2011 to 2021, by Weight

This figure shows the tons imported by the top three countries, plus China, and all other aggregated countries importing the most recyclable material from California by weight from 2011 to 2021.

Year	China	Taiwan	Vietnam	Thailand	All Other Countries	Total (All Countries)
2011	13,288,131	2,838,132	450,465	579,150	5,265,357	22,421,235
2012	11,482,361	3,020,868	323,867	367,820	4,703,161	19,898,077
2013	10,930,507	2,639,318	404,531	186,237	4,559,982	18,720,575
2014	10,309,389	2,582,829	311,298	314,617	4,575,747	18,093,880
2015	10,158,498	1,505,955	210,103	317,608	4,233,264	16,425,428
2016	9,272,629	1,551,198	340,524	358,113	3,482,204	15,004,668
2017	8,121,482	1,619,380	869,391	518,609	3,434,632	14,563,494
2018	6,587,935	2,288,542	1,402,895	421,106	4,719,081	15,419,559
2019	4,719,296	2,299,347	1,542,045	496,969	5,384,770	14,442,427
2020	3,801,604	2,110,235	1,389,542	588,912	5,511,258	13,401,551
2021	610,325	2,356,513	2,209,890	1,559,269	5,450,892	12,186,889

Figure 13 Data Table. Top Five Exported Recyclable Materials from California in 2021, by Weight

This figure shows the top categories of seaborne recyclable materials exported from California by weight (tons) in 2021.

Material Category	Tons	Percent of Total Seaborne Recyclable Exports
OCC and Kraft Paper	5,317,384	44%
Ferrous Metal	4,574,282	38%
Non-Ferrous Metal	965,201	8%
Unsorted Mixed Paper	471,226	4%
Other Misc. Paper	466,094	4%

Figure 14 Data Table. Top Five Exported Recyclable Materials from California in 2021, by Vessel Value

This figure shows the top categories of seaborne recyclable materials exported from California by vessel value (USD) in 2021.

Material Category	Vessel Value (USD)	Percent of Total Seaborne Recyclable Exports
Non-Ferrous Metal	$2,539,298,543	43%
Ferrous Metal	$1,857,730,214	32%
OCC and Kraft Paper	$908,978,174	15%
Worn Clothing	$126,686,618	2%
Other Misc. Paper	$100,863,699	2%

Figure 15 Data Table. Seaborne Exports of Ferrous Metals from California by Country of Import from 2011 to 2021, by Weight

This figure shows the amounts of Ferrous Metals exported as a recyclable material from California to other countries by weight (tons). The amount is broken out by country for the top three countries, plus China, importing ferrous metals in 2021. Material exported to all other countries is aggregated into “All Other Countries” category.

Year	Taiwan	Bangladesh	Vietnam	China	All Other Countries	Total (All Countries)
2011	2,623,921	3,553	289,678	1,782,837	3,470,960	8,170,949
2012	2,788,380	1,054	196,537	853,511	2,858,537	6,698,019
2013	2,396,744	441	296,436	923,344	2,665,503	6,282,468
2014	2,382,821	3,372	209,004	427,202	2,649,730	5,672,129
2015	1,337,094	95,697	102,555	348,606	2,362,803	4,246,755
2016	1,321,949	219,174	239,595	432,841	1,621,130	3,834,689
2017	1,385,516	275,979	573,667	522,800	1,861,963	4,619,925
2018	1,782,177	389,863	880,847	251,382	1,925,386	5,229,655
2019	1,609,512	608,486	814,098	35,405	2,305,479	5,372,982
2020	1,482,536	722,284	646,445	23,665	2,353,777	5,228,707
2021	1,273,564	833,675	789,861	56,724	1,620,458	4,574,282

Figure 16 Data Table Seaborne Recyclable Materials Exports of Ferrous Metals from California by Country of Import from 2011 to 2021, by Vessel Value

This figure shows the amounts of ferrous metals exported as a recyclable material from California to other countries by vessel value (USD). The amount is broken out by country for the top three countries, plus China, importing ferrous metals in 2021. Material exported to all other countries is aggregated into “All Other Countries” category.

Year	Taiwan	Bangladesh	Vietnam	China	All Other Countries	Total (All Countries)
2011	$1,193,023,622	$1,638,093	$115,682,721	$928,482,659	$1,508,151,931	$3,746,979,026
2012	$1,128,001,030	$478,000	$72,629,289	$579,854,645	$1,167,176,137	$2,948,139,101
2013	$880,875,577	$215,500	$99,108,751	$547,155,480	$1,011,056,970	$2,538,412,278
2014	$837,190,530	$1,009,495	$66,339,117	$373,956,091	$967,168,003	$2,245,663,236
2015	$390,364,012	$22,516,316	$21,447,886	$314,962,528	$615,088,296	$1,364,379,038
2016	$329,241,818	$41,958,672	$51,370,594	$270,151,270	$384,701,242	$1,077,423,596
2017	$401,976,832	$68,456,482	$147,301,921	$332,144,920	$548,388,646	$1,498,268,801
2018	$581,025,237	$123,312,283	$261,064,835	$133,665,719	$697,278,392	$1,796,346,466
2019	$487,484,743	$157,429,543	$215,851,899	$21,974,699	$720,499,548	$1,603,240,432
2020	$416,753,676	$172,943,147	$170,465,467	$20,364,724	$619,565,748	$1,400,092,762
2021	$469,196,519	$320,820,173	$288,552,550	$25,720,473	$753,440,499	$1,857,730,214

Figure 17 Data Table. Seaborne Exports of OCC and Kraft Paper from California by Country of Import from 2011 to 2021, by Weight

This figure shows the amount of old corrugated cardboard (OCC) and kraft paper exported as a recyclable material from California to other countries by weight (tons). The amount is broken out by country for the top three countries, plus China, importing OCC and Kraft Paper in 2021. Material exported to all other countries is aggregated into "All Other Countries" category.

Year	China	Vietnam	Taiwan	Thailand	All Other Countries	Total (All Countries)
2011	4,932,102	60,961	79,288	70,176	221,376	5,363,903
2012	4,819,125	35,398	80,724	33,602	288,017	5,256,866
2013	4,350,709	33,692	79,210	28,664	237,223	4,729,498
2014	4,486,509	36,308	66,248	19,423	331,458	4,939,946
2015	4,818,621	62,619	59,658	51,398	391,861	5,384,157
2016	4,469,992	54,969	147,649	68,176	284,822	5,025,608
2017	3,736,835	163,661	145,323	43,006	255,054	4,343,879
2018	4,276,757	371,991	315,741	127,925	584,475	5,676,889
2019	3,206,058	659,724	447,735	150,208	792,218	5,255,943
2020	2,663,201	684,901	481,491	170,166	976,784	4,976,543
2021	339,261	1,351,977	964,511	1,083,678	1,577,957	5,317,384

Figure 18 Data Table. Seaborne Exports of OCC and Kraft Paper from California by Country of Import from 2011 to 2021, by Vessel Value

This figure shows the amounts of old corrugated cardboard (OCC) and kraft paper exported as a recyclable material from California to other countries by vessel value (USD). The amount is broken out by country for the top three countries, plus China, importing OCC and Kraft Paper in 2021. Material exported to all other countries is aggregated into "All Other Countries" category.

Year	China	Vietnam	Taiwan	Thailand	All Other Countries	Total (All Countries)
2011	$669,678,009	$12,646,649	$15,190,186	$16,022,316	$35,905,875	$749,443,035
2012	$718,311,019	$6,855,509	$13,706,560	$6,462,140	$44,251,521	$789,586,749
2013	$642,837,906	$6,518,544	$14,223,492	$5,683,914	$40,799,718	$710,063,574
2014	$673,819,685	$6,314,441	$11,368,598	$3,636,844	$56,067,179	$751,206,747
2015	$694,114,003	$9,038,042	$10,166,056	$8,217,228	$64,098,539	$785,633,868
2016	$614,876,396	$7,769,676	$23,672,223	$10,205,250	$46,869,393	$703,392,938
2017	$547,987,974	$22,531,228	$22,662,634	$7,922,723	$43,815,348	$644,919,907
2018	$667,874,293	$53,596,327	$43,425,728	$15,866,864	$80,811,837	$861,575,049
2019	$478,710,868	$78,684,346	$56,097,782	$16,052,401	$98,277,406	$727,822,803
2020	$414,741,161	$91,342,416	$67,200,638	$21,614,270	$126,878,130	$721,776,615
2021	$61,035,048	$229,313,803	$179,401,954	$198,125,535	$241,101,834	$908,978,174

Figure 19 Data Table. Seaborne Exports of Plastics 1 and 2 from California by Country of Import from 2011 to 2021, by Weight

This figure shows the amounts of plastics 1 and 2 exported as a recyclable material from California to other countries by weight (tons). The amount is broken out by country for the top three countries, plus China, importing plastics 1 and 2 in 2021. Material exported to all other countries is aggregated into “All Other Countries” category.

Year	Malaysia	Vietnam	El Salvador	China	All Other Countries	Total (All Countries)
2011	4,879	2,887	118	346,062	141,123	495,069
2012	3,591	3,326	127	348,116	133,595	488,755
2013	22,154	8,161	404	316,167	157,061	503,947
2014	9,944	12,212	1,837	409,255	212,058	645,306
2015	9,839	10,902	3,297	276,359	213,800	514,197
2016	11,252	9,022	2,716	251,676	190,897	465,563
2017	25,766	31,732	3,188	182,253	147,371	390,310
2018	38,614	18,193	4,916	17,529	117,670	196,922
2019	9,565	6,548	5,728	10,953	74,737	107,531
2020	30,875	14,737	5,822	1,630	58,713	111,777
2021	25,430	7,923	12,414	102	35,664	81,533

Figure 20 Data Table. Seaborne Exports of Plastics 1 and 2 from California by Country of Import from 2011 to 2021, by Vessel Value

This figure shows the amounts of plastics 1 and 2 exported as recyclable material from California to other countries by vessel value (USD). The amount is broken out by country for the top three countries, plus China, importing plastics 1 and 2 in 2021. Material exported to all other countries is aggregated into “All Other Countries” category.

Year	Malaysia	Germany	El Salvador	China	All Other Countries	Total (All Countries)
2011	$2,135,568	$0	$85,081	$126,129,208	$57,155,399	$185,505,256
2012	$1,454,631	$0	$116,268	$120,469,677	$47,815,597	$169,856,173
2013	$4,439,897	$3,390	$1,978,163	$110,136,562	$59,084,672	$175,642,684
2014	$2,220,691	$0	$2,975,380	$142,380,927	$78,911,078	$226,488,076
2015	$2,323,295	$0	$2,779,956	$92,492,663	$73,977,387	$171,573,301
2016	$2,048,232	$0	$2,248,216	$84,251,493	$57,907,723	$146,455,664
2017	$5,304,243	$62,000	$2,889,237	$56,061,897	$56,301,390	$120,618,767
2018	$11,325,433	$783,000	$4,934,187	$4,276,395	$50,537,327	$71,856,342
2019	$2,394,371	$15,000	$4,218,626	$3,381,052	$30,153,752	$40,162,801
2020	$6,339,670	$2,558,163	$4,154,565	$839,439	$18,648,141	$32,539,978
2021	$5,612,691	$2,548,405	$14,173,262	$41,554	$13,191,683	$35,567,595

Figure 21 Data Table. Seaborne Exports and Truck & Rail Exports to Canada and Mexico of Plastic 1 and 2 from California from 2011 to 2021, by Weight

This figure shows the amount of plastics 1 and 2 exported as recyclable material from California to Canada, Mexico, and all seaborne exports from 2011 to 2021, by weight (tons).

Year	All Seaborne	Mexico (truck/rail)	Canada (truck/rail)
2011	495,069	1,226	187
2012	488,755	932	148
2013	503,947	579	152
2014	645,306	1,675	865
2015	514,197	1,323	605
2016	465,563	1,401	1,399
2017	390,310	1,844	840
2018	196,922	3,627	175
2019	107,531	6,089	446
2020	111,777	15,069	528
2021	81,533	31,536	714

Figure 22 Data Table. Seaborne Exports of Mixed Plastics 3 through 7 from California by Country of Import from 2011 to 2021, by Weight

This figure shows the amounts of mixed plastics 3 through 7 exported as a recyclable material from California to other countries by weight (tons). The amount is broken out by country for the top three countries, plus China, importing mixed plastics 3 through 7 in 2021. Material exported to all other countries is aggregated into “All Other Countries” category.

Year	Malaysia	Taiwan	Korea, Republic Of	China	All Other Countries	Total (All Countries)
2011	6,785	7,247	3,695	445,678	291,224	754,629
2012	8,446	6,696	2,835	434,473	206,348	658,798
2013	12,516	10,228	4,602	378,014	203,419	608,779
2014	13,773	10,066	3,520	342,508	255,385	625,252
2015	15,181	19,276	2,093	305,975	280,715	623,240
2016	11,283	7,419	1,885	207,532	293,494	521,613
2017	40,501	6,540	2,756	162,304	188,670	400,771
2018	82,254	7,861	9,654	11,165	88,128	199,062
2019	18,543	4,451	7,544	2,768	29,494	62,800
2020	23,094	4,610	3,789	541	16,476	48,510
2021	9,312	1,349	1,244	1	4,848	16,754

Figure 23 Data Table. Seaborne Exports of Mixed Plastics 3 through 7 from California by Country of Import from 2011 to 2021, by Vessel Value

This figure shows the amounts of mixed plastics 3 through 7 exported as a recyclable material from California to other countries by vessel value (USD). The amount is broken out by country for the top three countries, plus China, importing mixed plastics 3 through 7 in 2021. Material exported to all other countries is aggregated into "All Other Countries" category.

Year	Malaysia	Korea, Republic Of	Germany	China	All Other Countries	Total (All Countries)
2011	$1,776,842	$2,425,108	$354,241	$209,267,705	$113,875,133	$327,699,029
2012	$2,825,700	$2,112,265	$0	$163,918,921	$84,775,891	$253,632,777
2013	$3,533,421	$3,368,748	$0	$134,389,549	$75,274,244	$216,565,962
2014	$3,659,202	$2,222,139	$528,083	$116,949,724	$89,878,204	$213,237,352
2015	$3,218,392	$1,890,625	$0	$91,550,736	$98,949,686	$195,609,439
2016	$2,064,834	$617,515	$0	$58,236,389	$81,237,393	$142,156,131
2017	$8,854,452	$896,579	$0	$45,602,661	$54,788,548	$110,142,240
2018	$17,759,163	$3,171,552	$30,000	$4,165,367	$30,299,783	$55,425,865
2019	$3,828,638	$2,818,452	$159,000	$1,954,302	$9,578,304	$18,338,696
2020	$3,569,788	$1,622,521	$148,685	$219,074	$5,499,574	$11,069,642
2021	$1,994,867	$754,909	$769,400	$4,224	$2,399,686	$5,923,086

Figure 24 Data Table. Seaborne Exports and Truck & Rail Exports to Canada and Mexico of Mixed Plastics 3 through 7 from California from 2011 to 2021, by Weight

This figure shows the amount of mixed plastics 3 through 7 exported as recyclable material from California to Canada, Mexico, and all seaborne exports from 2011 to 2021, by weight (tons).

Year	All Seaborne	Mexico (truck/rail)	Canada (truck/rail)
2011	754,629	3,699	546
2012	658,798	5,420	1,552
2013	608,779	6,652	1,494
2014	625,252	6,063	762
2015	623,240	3,804	160
2016	521,613	12,289	822
2017	400,771	24,519	1,738
2018	199,062	25,914	2,118
2019	62,800	20,393	3,791
2020	48,510	19,575	1,772
2021	16,754	11,799	2,831

Figure 25 Data Table. Seaborne Exports of Non-Ferrous Metals from California by Country of Import from 2011 to 2021, by Weight

This figure shows the amounts of non-ferrous metals exported as a recyclable material from California to other countries by weight (tons). The amount is broken out by country for the top four countries importing nonferrous metals in 2021. Material exported to all other countries is aggregated into “All Other Countries” category.

Year	Korea, Republic Of	Malaysia	China	Hong Kong	All Other Countries	Total (All Countries)
2011	157,244	4,195	1,299,122	48,845	147,709	1,657,115
2012	146,404	3,931	1,157,294	35,980	142,485	1,486,095
2013	121,970	1,287	1,086,727	49,512	169,080	1,428,576
2014	144,139	3,854	941,943	36,644	147,522	1,274,102
2015	151,472	13,357	788,359	30,060	101,389	1,084,637
2016	135,338	16,178	674,938	41,423	101,678	969,555
2017	162,514	18,038	713,378	51,369	111,453	1,056,752
2018	227,603	118,741	352,200	50,341	261,046	1,009,931
2019	246,007	216,979	154,598	80,420	282,537	980,541
2020	240,419	238,447	115,691	33,521	292,160	920,238
2021	231,145	214,973	129,808	97,180	292,095	965,201

Figure 26 Data Table. Seaborne Exports of Nonferrous Metals from California by Country of Import from 2011 to 2021, by Vessel Value

This figure shows the amounts of non-ferrous metals exported as a recyclable material from California to other countries, by vessel value (USD). The amount is broken out by country for the top four countries importing nonferrous metals in 2021. Material exported to all other countries is aggregated into “All Other Countries” category.

Year	Korea, Republic Of	Malaysia	China	Japan	All Other Countries	Total (All Countries)
2011	$301,760,633	$6,041,429	$2,966,216,561	$161,837,038	$366,098,444	$3,801,954,105
2012	$268,898,703	$6,736,595	$2,421,475,210	$141,021,475	$274,570,020	$3,112,702,003
2013	$238,877,367	$1,782,528	$2,345,546,397	$160,959,741	$305,503,504	$3,052,669,537
2014	$275,913,121	$5,190,724	$1,903,918,316	$237,195,715	$278,184,466	$2,700,402,342
2015	$269,410,847	$12,789,212	$1,435,709,687	$151,201,148	$240,380,866	$2,109,491,760
2016	$205,318,227	$16,641,002	$1,040,177,841	$201,715,633	$300,099,836	$1,763,952,539
2017	$256,957,851	$21,921,188	$1,247,207,090	$209,209,358	$274,049,275	$2,009,344,762
2018	$419,715,521	$157,270,662	$756,683,273	$238,004,823	$465,903,541	$2,037,577,820
2019	$402,427,773	$271,394,876	$254,877,657	$190,014,370	$559,768,396	$1,678,483,072
2020	$404,944,821	$284,684,175	$252,998,724	$165,973,116	$513,140,371	$1,619,741,207
2021	$539,313,530	$373,227,028	$687,457,865	$254,399,596	$684,900,524	$2,539,298,543

Appendix 2: Additional Information on Total Exports and Recyclable Materials Exports from California Seaports

California Total Seaborne Exports

Table 5. Total Seaborne Exports from California in 2021, by Weight

Recyclable Materials Exports (Tons)	Other Exports (Tons)	Total Exports (Tons)
12.2 million	43.6 million	55.8 million

Figure 27. Total Seaborne Exports from California from 1998 to 2021, by Weight

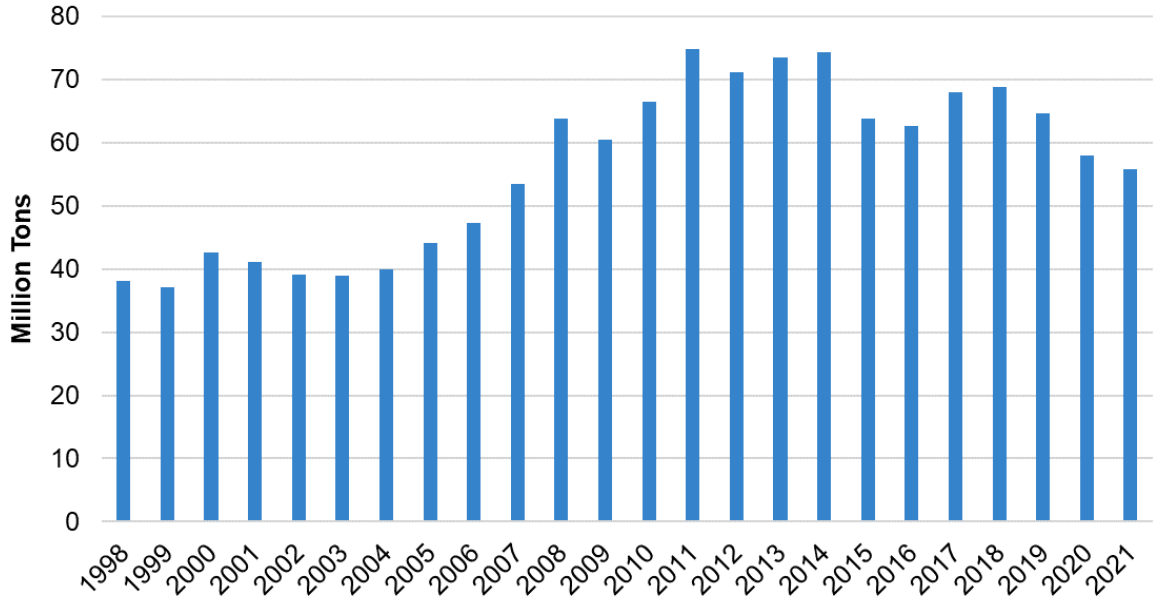


Figure 27 Data Table. Total Seaborne Exports from California from 1998 to 2021, by Weight

This figure shows total California exports split by recyclable materials and other exports from 1998 to 2021, by weight.

Year	Recyclable Materials Exports (Tons)	All Other Exports (Tons)	Total Exports (Tons)
1998	4,272,994	33,768,365	38,041,359
1999	5,083,108	31,990,150	37,073,258
2000	6,320,731	36,334,233	42,654,964
2001	7,271,304	33,849,628	41,120,932
2002	7,630,840	31,418,742	39,049,582
2003	9,549,578	29,444,761	38,994,339
2004	10,087,098	29,903,460	39,990,558
2005	11,938,685	32,122,320	44,061,005
2006	13,153,708	34,026,039	47,179,747
2007	16,243,610	37,222,845	53,466,455
2008	19,598,613	44,169,922	63,768,535
2009	18,687,562	41,681,572	60,369,134
2010	18,684,429	47,797,744	66,482,173
2011	22,421,235	52,290,850	74,712,085
2012	19,898,077	51,162,053	71,060,130
2013	18,720,575	54,791,990	73,512,565
2014	18,093,880	56,148,521	74,242,401
2015	16,425,428	47,352,603	63,778,031
2016	15,004,668	47,513,786	62,518,454
2017	14,563,494	53,391,771	67,955,265
2018	15,419,559	53,342,716	68,762,275
2019	14,442,427	50,180,835	64,623,262
2020	13,401,551	44,599,776	58,001,327
2021	12,186,889	43,609,702	55,796,591

Table 6. Total Seaborne Exports from California in 2021, by Vessel Value

Recyclable Materials Exports (USD)	Other Exports (USD)	Total Exports (USD)
$5.9 billion	$75.9 billion	$81.8 billion

Figure 28. Total Seaborne Exports from California from 1998 to 2021, by Vessel Value

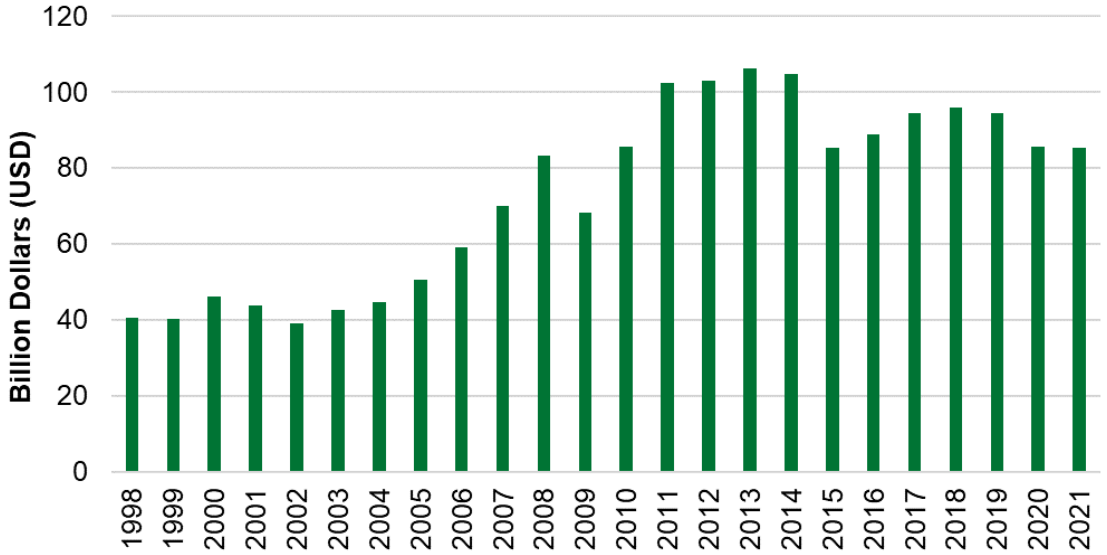


Figure 28 Data Table. Total Seaborne Exports from California from 1998 to 2021, by Vessel Value

This figure shows total California exports split by recyclable materials and all other exports from 1998 to 2021, by vessel value (USD).

Year	Recyclable Materials Exports (USD)	All Other Exports (USD)	Total Exports (USD)
1998	$775,658,290	$39,821,934,564	$40,597,592,854
1999	$875,236,881	$39,216,984,750	$40,092,221,631
2000	$1,299,866,371	$44,913,919,500	$46,213,785,871
2001	$1,288,651,784	$42,438,765,714	$43,727,417,498
2002	$1,303,679,253	$37,769,985,010	$39,073,664,263
2003	$1,757,906,800	$40,720,710,629	$42,478,617,429
2004	$2,407,187,755	$42,386,450,467	$44,793,638,222
2005	$3,344,559,648	$47,200,806,881	$50,545,366,529
2006	$5,223,647,937	$53,976,563,513	$59,200,211,450
2007	$7,235,559,060	$62,665,140,333	$69,900,699,393
2008	$8,806,032,285	$74,519,026,702	$83,325,058,987
2009	$5,830,066,873	$62,279,753,431	$68,109,820,304
2010	$7,656,043,029	$77,889,749,335	$85,545,792,364
2011	$10,028,140,634	$92,457,038,362	$102,485,178,996
2012	$8,237,767,017	$94,697,754,139	$102,935,521,156
2013	$7,605,086,054	$98,735,641,688	$106,340,727,742
2014	$6,970,882,999	$97,856,396,567	$104,827,279,566
2015	$5,386,926,247	$79,810,156,226	$85,197,082,473
2016	$4,571,461,619	$84,373,944,003	$88,945,405,622
2017	$5,119,174,368	$89,410,020,707	$94,529,195,075
2018	$5,594,550,006	$90,263,534,375	$95,858,084,381
2019	$4,819,248,316	$89,575,667,108	$94,394,915,424
2020	$4,467,521,954	$81,112,312,302	$85,579,834,256
2021	$5,890,377,803	$75,898,313,192	$81,789,190,995

Seaborne Recyclable Materials Exports from California in 2021, by Vessel Value

Table 7. Seaborne Recyclable Materials Exports from California in 2021 by Top Countries of Import, by Vessel Value

Top 10 Countries	2021 Vessel Value (USD)	Vessel Value Change 2020 to 2021 (USD)	Percent Change in Vessel Value from 2020 to 2021	Percent of Total Recyclable Materials Exports
China (CHN)	$863,230,648	-$95,347,440	-10%	15%
Korea (KOR)	$844,662,756	$178,690,861	27%	14%
Taiwan (TWN	$795,234,964	$188,097,285	31%	14%
Malaysia (MYS)	$595,593,919	$152,748,794	34%	10%
Vietnam (VNM)	$547,632,791	$240,087,609	78%	9%
Thailand (THA)	$437,570,706	$260,589,362	147%	7%
Bangladesh (BGD)	$321,166,375	$148,123,815	85%	5%
Japan (JPN)	$301,326,357	$85,355,962	40%	5%
India (IND)	$227,359,231	$12,223,656	6%	4%
Hong Kong (HKG)	$206,850,100	$146,088,871	240%	4%

Figure 29. Seaborne Recyclable Materials Exports from California by Country of Import from 2011 to 2021 by Vessel Value

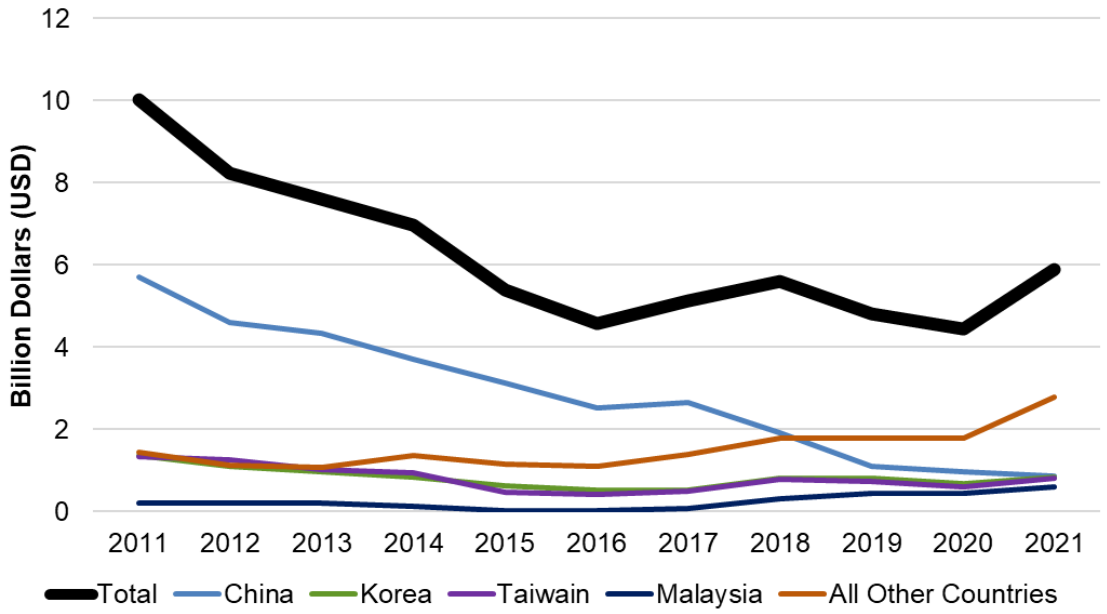


Figure 29 Data Table. Seaborne Recyclable Materials Exports from California by Country of Import from 2011 to 2021, by Vessel Value

This figure shows the amount of seaborne recyclable materials exports from California to other countries by vessel value (USD). Amount is broken out by country for the top four countries importing recyclable materials in 2021. Material exported to all other countries is aggregated into “All Other Countries” category.

Year	China	Korea, Republic Of	Taiwan	Malaysia	All Other Countries	Total (All Countries)
2011	$5,701,204,117	$1,357,753,102	$1,331,618,865	$206,773,858	$1,430,790,692	$10,028,140,634
2012	$4,594,985,500	$1,084,261,827	$1,252,329,238	$191,239,781	$1,114,950,671	$8,237,767,017
2013	$4,347,730,436	$975,437,267	$1,009,625,862	$192,189,515	$1,080,102,974	$7,605,086,054
2014	$3,707,647,215	$834,624,761	$947,128,980	$111,904,537	$1,369,577,506	$6,970,882,999
2015	$3,112,412,503	$627,294,614	$475,959,284	$25,331,567	$1,145,928,279	$5,386,926,247
2016	$2,510,105,479	$517,267,475	$420,911,201	$29,041,076	$1,094,136,388	$4,571,461,619
2017	$2,657,359,030	$523,027,809	$484,933,974	$77,813,208	$1,376,040,347	$5,119,174,368
2018	$1,919,674,076	$804,202,194	$784,785,220	$298,186,790	$1,787,701,726	$5,594,550,006
2019	$1,102,524,776	$795,415,451	$719,040,047	$431,026,464	$1,770,952,941	$4,818,959,679
2020	$958,578,088	$665,971,895	$607,137,679	$442,845,125	$1,768,999,542	$4,443,532,329
2021	$863,230,648	$844,662,756	$795,234,964	$595,593,919	$2,791,655,516	$5,890,377,803

Seaborne Recyclable Materials Exports from California by Individual Recyclable Material Category

Other Miscellaneous (Misc.) Mixed Paper

Table 8. Other Misc. Mixed Paper Exported as Recyclable Materials from California in 2021, by Weight and Vessel Value

Tons Exported	Percent Change in Tons from 2020	Vessel Value (USD)	Percent Change in Vessel Value from 2020
466,094	-68%	$100,863,699	-61%

Figure 30. Seaborne Recyclable Materials Exports of Other Misc. Mixed Paper from California by Country of Import from 2011 to 2021, by Weight

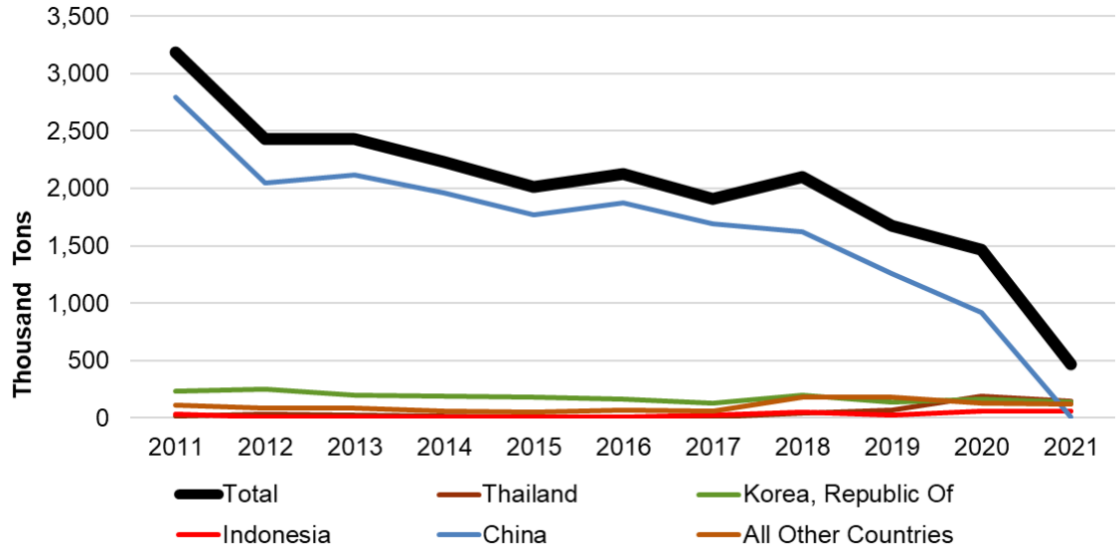


Figure 30 Data Table: Seaborne Recyclable Materials Exports of Other Misc. Mixed Paper from California by Country of Import from 2011 to 2021, by Weight

This figure shows the amount of Other Misc. Mixed Paper exported as a recyclable material from California to other countries, by weight (tons). The amount is broken out by country for the top three countries, plus China, importing Other Misc. Mixed Paper in 2021. Material exported to all other countries is aggregated into the "All Other Countries" category.

Year	China	Thailand	Korea, Republic Of	Indonesia	All Other Countries	Total (All Countries)
2011	2,792,669	13,515	234,008	34,750	110,486	3,185,428
2012	2,046,568	31,679	254,114	8,267	85,999	2,426,627
2013	2,113,779	24,574	202,649	8,967	83,728	2,433,697
2014	1,963,063	14,743	187,071	8,588	55,396	2,228,861
2015	1,768,424	10,245	179,961	9,877	47,916	2,016,423
2016	1,877,122	11,414	165,530	5,022	67,039	2,126,127
2017	1,690,181	9,262	126,979	20,965	58,890	1,906,277
2018	1,626,521	42,252	197,823	49,568	180,913	2,097,077
2019	1,259,226	69,454	133,565	26,940	181,659	1,670,844
2020	921,968	187,734	165,690	61,706	126,061	1,463,159
2021	10,056	145,293	134,077	57,203	119,465	466,094

Mechanical Pulp Paper (Subset of Other Misc. Mixed Paper)

Table 9. Mechanical Pulp Paper Exported as Recyclable Materials from California in 2021, by Weight and Vessel Value

Tons Exported	Percent Change in Tons from 2020	Vessel Value (USD)	Percent Change in Vessel Value from 2020
171,679	-85%	$42,897,197	-79%

Figure 31. Seaborne Recyclable Materials Exports of Mechanical Pulp Paper from California by Country of Import from 2011 to 2021, by Weight

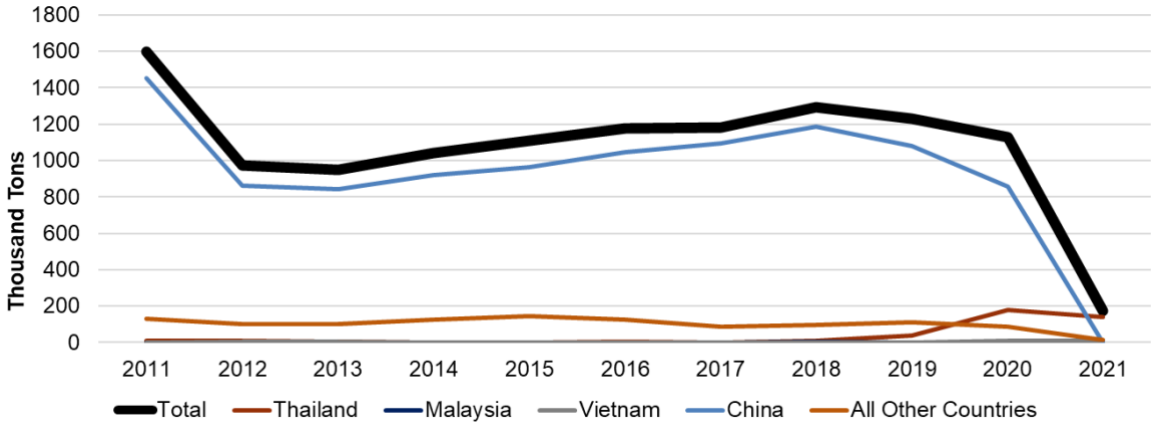


Figure 31 Data Table: Seaborne Recyclable Materials Exports of Mechanical Pulp Paper from California by Country of Import from 2011 to 2021, by Weight

This figure shows the amount of Mechanical Pulp Paper exported as a recyclable material from California to other countries by weight (tons). The amount is broken out by country for the top three countries, plus China, importing Mechanical Pulp Paper in 2021. Material exported to all other countries is aggregated into the "All Other Countries" category.

Year	China	Malaysia	Thailand	Vietnam	All Other Countries	Total (All Countries)
2011	1,452,206	0	11,563	771	131,160	1,595,700
2012	862,844	0	9,233	2,144	100,507	974,728
2013	842,232	0	4,190	2,798	100,974	950,194
2014	917,871	0	1,656	0	123,708	1,043,235
2015	961,672	0	1,326	539	144,408	1,108,017
2016	1,044,691	0	6,686	1,111	125,136	1,177,624
2017	1,094,381	0	116	1,373	85,738	1,181,608
2018	1,183,904	4,191	7,221	1,181	97,413	1,293,910
2019	1,080,624	0	39,366	1,393	109,192	1,230,575
2020	856,345	539	177,983	8,579	86,559	1,130,005
2021	1,208	9,020	140,805	8,084	12,562	171,679

Chemical Pulp Paper (Subset of Other Misc. Mixed Paper)

Table 10. Chemical Pulp Paper Exported as Recyclable Materials from California in 2021, by Weight and Vessel Value

Tons Exported	Percent Change in Tons from 2020	Vessel Value (USD)	Percent Change in Vessel Value from 2020
29,909	-39%	$7,648,222	-17%

Figure 32. Seaborne Recyclable Materials Exports of Chemical Pulp Paper from California by Country of Import from 2011 to 2021, by Weight

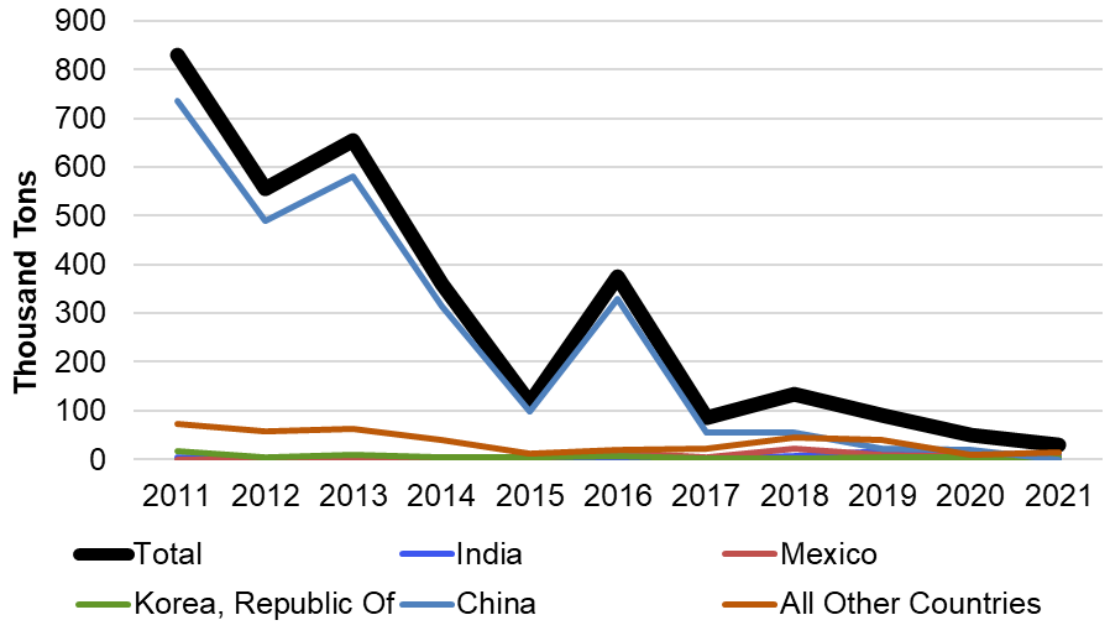


Figure 32 Data Table: Seaborne Recyclable Materials Exports of Chemical Pulp Paper from California by Country of Import from 2011 to 2021, by Weight

This figure shows the amount of Chemical Pulp Paper exported as a recyclable material from California to other countries, by weight (tons). The amount is broken out by country for the top three countries, plus China, importing Chemical Pulp Paper in 2021. Material exported to all other countries is aggregated into the "All Other Countries" category.

Year	China	India	Mexico	Korea, Republic Of	All Other Countries	Total (All Countries)
2011	735,382	4,241	0	15,909	73,352	828,884
2012	489,357	3,063	512	5,280	57,403	555,615
2013	579,710	1,239	572	10,250	63,393	655,164
2014	313,434	850	444	5,227	40,671	360,626
2015	98,890	1,502	2,073	3,389	11,434	117,288
2016	330,253	671	15,645	8,152	19.607	374,328
2017	54,026	2,169	5,433	3,009	21,824	86,461
2018	54,444	7,812	22,092	2,171	46,310	132,829
2019	21,038	15,977	10,045	4,714	39,416	91,190
2020	19,572	11,447	5,964	3,360	8,908	49,251
2021	0	8,731	4,098	3,598	13,482	29,909

Copper Wire (Subset of Non-Ferrous Metal)

Table 11. Copper Wire Exported as Recyclable Materials from California in 2021, by Weight and Vessel Value

Tons Exported	Percent Change in Tons from 2020	Vessel Value (USD)	Percent Change in Vessel Value from 2020
21,644	-33%	$156,608,829	-6%

Figure 33. Seaborne Recyclable Materials Exports of Copper Wire from California by Country of Import from 2011 to 2021, by Weight

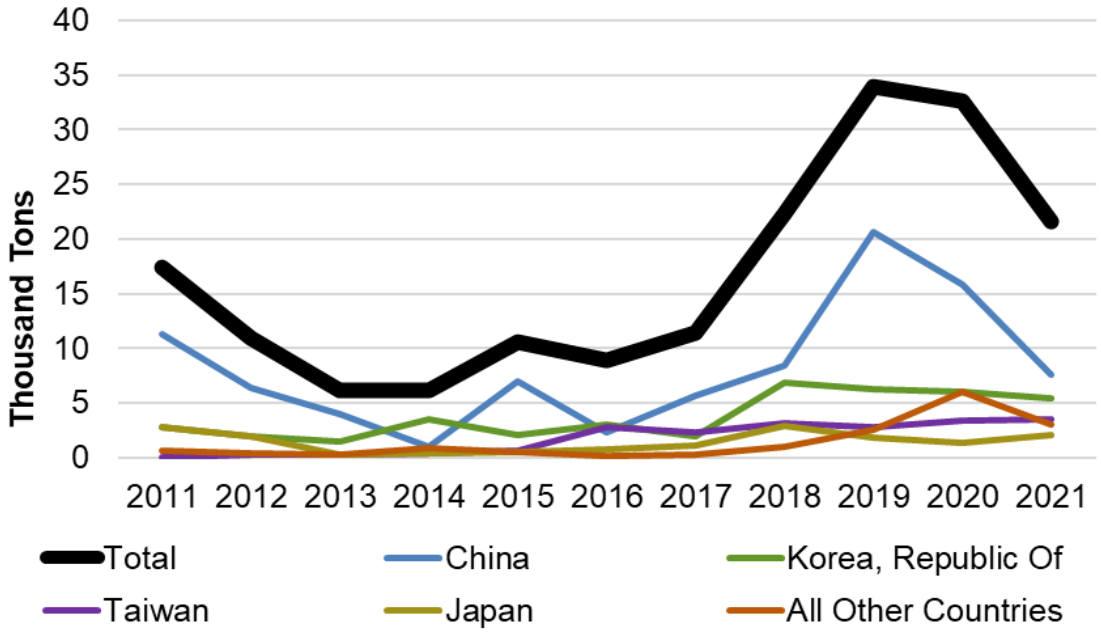


Figure 33 Data Table: Seaborne Recyclable Materials Exports of Copper Wire from California by Country of Import from 2011 to 2021, by Weight

This figure shows the amount of Copper Wire exported as a recyclable material from California to other countries, by weight (tons). The amount is broken out by country for the top four countries importing Copper Wire in 2021. Material exported to all other countries is aggregated into the “All Other Countries” category.

Year	China	Korea, Republic Of	Taiwan	Japan	All Other Countries	Total (All Countries)
2011	11,278	2,756	59	2,735	609	17,437
2012	6,407	1,904	268	1,979	329	10,887
2013	3,979	1,423	243	267	266	6,178
2014	974	3,481	407	416	864	6,142
2015	6,918	2,006	649	463	525	10,561
2016	2,246	3,018	2,815	698	155	8,932
2017	5,677	1,964	2,325	1,144	296	11,406
2018	8,464	6,812	3,146	2,866	988	22,276
2019	20,601	6,284	2,809	1,788	2,500	33,982
2020	15,831	6,044	3,409	1,347	5,999	32,630
2021	7,613	5,453	3,479	2,048	3,051	21,644

Aluminum Cans (Subset of Non-Ferrous Metal)

Table 12. Aluminum Cans Exported as Recyclable Materials from California in 2021, by Weight and Vessel Value

Tons Exported	Percent Change in Tons from 2020	Vessel Value (USD)	Percent Change in Vessel Value from 2020
86,457	85%	$148,273,116	174%

Figure 34. Seaborne Recyclable Materials Exports of Aluminum Cans from California by Country of Import from 2011 to 2021, by Weight

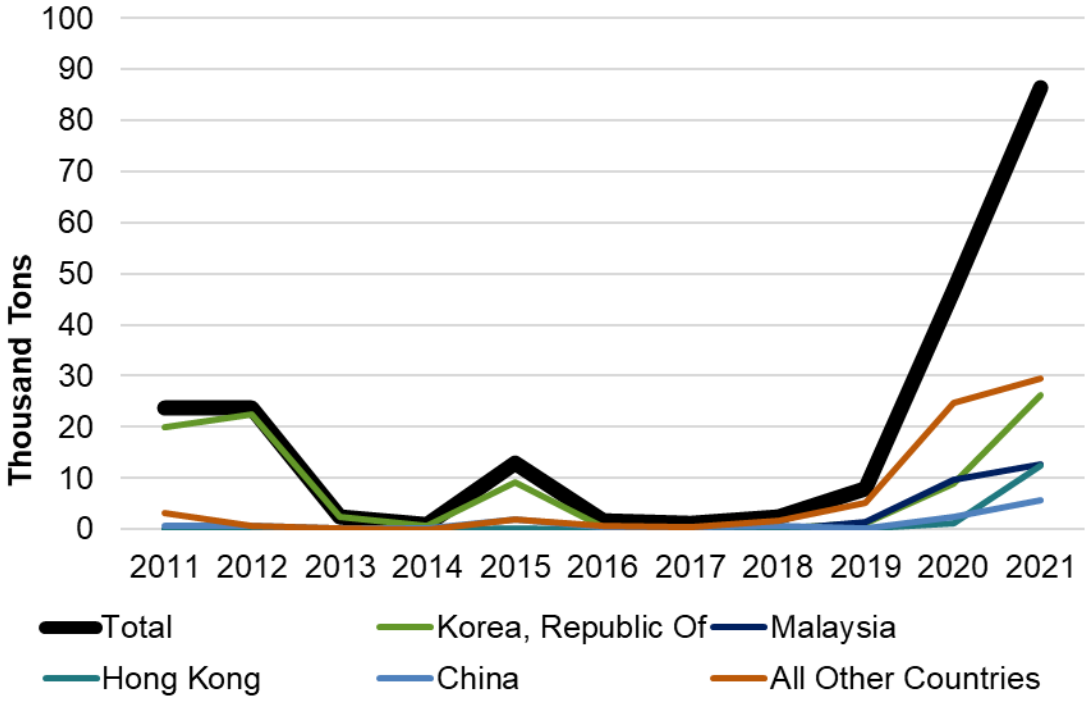


Figure 34 Data Table: Seaborne Recyclable Materials Exports of Aluminum Cans from California by Country of Import from 2011 to 2021, by Weight

This figure shows the amount of Aluminum Cans exported as a recyclable material from California to other countries, by weight (tons). The amount is broken out by country for the top three countries, plus China, importing Aluminum Cans in 2021. Material exported to all other countries is aggregated into the “All Other Countries” category.

Year	Korea, Republic Of	Malaysia	Hong Kong	China	All Other Countries	Total (All Countries)
2011	19,970	0	0	632	3,052	23,654
2012	22,371	0	0	574	696	23,641
2013	2,292	0	0	193	44	2,529
2014	626	0	0	207	22	855
2015	9,071	0	183	1,849	1,931	13,034
2016	370	0	7	525	747	1,649
2017	301	0	0	489	359	1,149
2018	194	0	0	596	1,548	2,338
2019	1,171	1,426	119	110	5,207	8,033
2020	9,018	9,603	1,136	2,445	24,613	46,815
2021	26,156	12,701	12,362	5,690	29,548	86,457

Abbreviations and Acronyms

AB – Assembly Bill

ADA – Americans with Disability Act

ADC – Alternative Daily Cover

AIC – Alternative Intermediate Cover

CalRecycle – California Department of Resource Recycling and Recovery

EMSW – Engineered Municipal Solid Waste

HS – Harmonized System

OCC – Old Corrugated Cardboard

PCBs – Polychlorinated Biphenyls

PET – Polyethylene Terephthalate

PS – Polystyrene

PV – Polymers of Vinyl

Q3 – Quarter 3

Q4 – Quarter 4

RDRS – Recycling and Disposal Reporting System

USD – U.S. dollars

WISERTrade – World Institute for Strategic Economic Research

Glossary of Terms

Alternative daily cover (ADC) and Alternative intermediate cover (AIC): The use of materials to cover disposed waste in a landfill cell at the end of the landfill operating day (daily cover) or at some other interval (intermediate cover) to control odors, fire, vectors, litter, and scavenging.

Biomass conversion: The process of using controlled combustion of specified types of organic materials (usually wood, lawn, or crop residue) to produce electricity.

Landfill Disposal: Disposal of waste materials at a landfill, excluding materials disposed as part of disposal-related activities.

Disposal-Related Activities: A set of activities considered as part of overall disposal: alternative daily cover, alternative intermediate cover, other beneficial reuse at landfills (such as construction activities, landscaping, and erosion control), transformation, engineered municipal solid waste, and waste-tire derived fuel.

Landfill: A permitted facility that provides a legal site for final disposal of materials, including mixed solid waste, beneficial materials used for landfill construction, ADC, and specialized material sites such as waste tires and construction and demolition waste.

Other beneficial reuse: The use of a waste byproduct or other low-value material for a productive use, other than ADC/AIC, at a landfill within regulatory guidelines.

Per-capita disposal: A numeric indicator of reported disposal divided by the population (residents) specific to a county, region, or state.

Recyclable Materials Exports: Recyclable materials exported via seaborne container vessels from California ports

Recycling and Disposal Reporting System (RDRS): The new system used to track recycling and disposal information. For more information go to: Recycling and Disposal Reporting System Information

Transformation: The use of incineration, pyrolysis, distillation, or biological conversion to combust unprocessed or minimally processed solid waste to produce electricity. Transformation does not include gasification, composting, or biomass conversion.

Vessel Value: The value of exports at the U.S. seaport, airport, or border port of export, based on the transaction price, including inland freight, insurance, and other charges incurred in placing the merchandise alongside the carrier at the U.S. port of exportation. The value, as defined, excludes the cost of loading the merchandise and any charges or transportation costs beyond the port of exportation. Also known as the “free alongside ship value.

Waste tire-derived fuel: Waste tires used as fuel in a power plant or cement kiln.

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