

# **2017 California Exports of Recyclable Materials**



California Department of Resources Recycling and Recovery

**February 2019**

**S T A T E   O F   C A L I F O R N I A**

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# Executive Summary

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This report details the export of recyclable materials from California ports and highlights international recycling market trends in 2017. A more detailed discussion of ramifications of changes in recyclable material exports is provided in the 2017 State of Recycling and Disposal Report. Understanding the export of recyclable materials is a necessary component in characterizing the California waste stream and is a significant factor in meeting California's recycling goals and local jurisdiction waste diversion mandates.

California's ports exported 14.6 million tons of recyclable materials to international markets in 2017. The materials had a vessel value of \$5.1 billion USD. China, Korea, and Taiwan received 75 percent (by weight) of all recyclable materials shipped overseas from California ports. China accepted 8.1 million tons of recyclable materials from California ports in 2017.

California recyclable materials exports have been steadily declining since 2011, dropping over 33 percent in weight since then, which resulted in a corresponding drop in vessel value of nearly \$5 billion. In the last year, recyclable materials exports from California ports decreased by about 441,000 tons, or 3 percent, while increasing in vessel value by nearly \$550 million. Significant changes were observed in the export to specific countries. For example, California ports exported 1.2 million fewer tons of recyclable materials to China in 2017 than in 2016, reflecting a reduction of 12 percent. This material reduction was almost entirely composed of unsorted mixed paper.

China implemented stringent import inspection restrictions that greatly contributed to last year's overall reduction of recyclable exports. Historically, China has been the largest recipient of recyclable materials from California ports. These new import restrictions were primarily enacted in 2018, but the announcement of these policies in 2017 had a marked impact on the export of specific material types to China in the latter part of that year. Other countries, notably in Southeast Asia, also introduced new policies and implemented measures to regulate recyclable materials imports.

California's recycling infrastructure has heavily relied upon the export of recyclable materials from California ports. Unfortunately, the past year has been marked by increased inspection restrictions put into effect by the countries importing recyclable materials. Uncertainty in global recycling markets creates significant challenges for California. As we look to the future, California can no longer rely on exports as a sustainable component of the state's recycling infrastructure.

# Background

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Exported recyclable materials are an important facet of California's solid waste stream. Detailing and analyzing export data provides critical information of where recyclable materials go, as well as trends in amounts, destinations, and international markets. AB 341 (Chesbro, Chapter 476, Statutes of 2011) established a statewide goal of 75 percent recycling, composting, or source reduction of solid waste by 2020. The examination of recyclable exports helps California better understand how exports and global markets play a critical role in meeting this statewide recycling goal. Sufficient markets for these materials are in question right now, as global policies impact the flow of these materials.

Currently, recycling in California has a strong collection and sorting infrastructure with domestic markets for only some of the recyclable materials we generate. Recyclable material collectors, handlers, processors, and exporters are not currently required to report to CalRecycle. California does not have sufficient local markets to accommodate all recyclable materials collected within the state.

This report addresses the following questions:

- How many tons of recyclable materials did California ports export in 2017?
- What types of recyclable materials did California ports export in 2017?
- What was the vessel value of these exported recyclable materials?
- Where did the exported materials go?
- How has the export of recyclable materials from California changed over time?
- How will changes to the international recycling market affect California exports?

# Methods

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The data presented in this report comes primarily from WISERTrade<sup>1</sup> unless otherwise noted. The most common mode of international export of recyclable materials from California has been via container vessels that backhaul recyclable materials to Asia after delivering consumer products to American markets. WISERTrade also includes some information regarding materials exported by air, but this is not a typical means for exporting recyclable materials. This report only includes data available for seaborne recyclable materials exports.

WISERTrade includes data on all material exports from California ports. Recyclable commodities were identified and extracted from the database by examining each commodity's harmonized system code. This system is an international standard that assigns numeric codes to traded commodities. For the purpose of this exports report, specific recyclable commodities were combined into custom groups to represent common recyclable categories by type or particular interest. All weights shown are in tons, or 2,000 lbs.

Table 1 provides examples of the material types that are found within each material category.

In order to provide more details on material flows that have been impacted by international policies and restrictions, the material categories used in this report differ from previous export reports. The mixed paper category previously reported (which included unsorted mixed paper, cardboard, paperboard, and other paper based materials) has been divided into three reportable material categories. These new categories are: old corrugated cardboard (OCC); unsorted mixed paper; and other miscellaneous mixed paper. Plastics categories were previously reported as: plastics 1, 2, and 4; and other plastics 3, 5, and 7. These categories have been changed to: plastics 1 and 2; and mixed plastics 3-7. The purpose of this restructuring is to provide additional details on materials that have been markedly impacted by recent changes to recyclable material import policies.

*Table 1: Recyclable Materials Categories*

<b>Material Category</b>	<b>Material Types in Category</b>
high grade paper	office paper scrap, deinking waste paper, and paperboard
OCC and craft paper	cardboard (OCC), brown paperboard, kraft paper
unsorted mixed paper	unsorted mixed paper
other miscellaneous mixed paper	mechanical pulp, newsprint
plastics 1, 2	polyethylene (PET), PET scrap
mixed plastics 3-7	polymers of vinyl (PV), polystyrene (PS), other plastic not PET
glass	cullet and other waste scrap glass
tire and rubber scrap	waste parings and scraps of rubber, and retreads of tires
used oil and grease	waste oils made of polychlorinated biphenyls (PCBs), and other grease and light oils
batteries	waste and scrap of batteries and electric storage batteries.
worn clothing	worn clothing and other worn items, and rags
copper wire	copper wire waste and scrap
ferrous metals	ferrous metal waste and scrap
non-ferrous metals	aluminum cans, brass, copper, zink, tin, tungsten and other metals, waste and scrap

Information is also provided separately for aluminum cans, though their weight and vessel value are also included in the data for non-ferrous metals.

Weight and vessel value information was aggregated from WISERTrade for the material categories identified above, as well as for all recyclable materials. The data was compiled to provide yearly export information to compare with previous years. Additionally, CalRecycle staff evaluated data on key material types on a monthly interval to examine the impacts of international recycling import policies affecting California's export markets.

Changes in export values or tonnages in some of these material categories may be caused by changes in one or more of the components to the category. Changes for a material category do not necessarily mean that every material component within that category is impacted the same.



# Data Limitations

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Available data regarding interstate (road or railroad) recyclable materials exports is limited and is not updated as frequently as seaborne or air exports. No new data on road or railroad exports has been released since the [2016 CalRecycle Exports](#) report. Because of this, there is also potential for some materials to be generated in California and exported internationally via ports in other states, or for materials generated out of state to be exported via California ports. Neither of these factors are accounted for in the data presented in this report.

CalRecycle does not currently collect data on the flow of recyclable materials within the state of California. In 2015, Governor Brown signed AB 901 (Gordon, Chapter 746), which changes how recyclable material, organics, and solid waste are reported to CalRecycle. CalRecycle is in the formal rulemaking process to approve reporting regulations pursuant to section 41821.5 of the Public Resources Code. Once adopted, the regulations will require recycling facilities and operations within California to report on the flow of recyclable materials. This will ultimately improve the data regarding how much recyclable material is exported from California. This additional data source is expected to be available for the 2019 report on California Exports, as reporting under this regulation is anticipated to begin in the third quarter of 2019.

# Results - 2017 Recyclable Materials Exports

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Based on the 2017 WISERTrade data, 14.6 million tons of recyclable materials, with a vessel value of \$5.1 billion USD, were exported from California ports to international markets. Compared to 2016 export data, there were approximately 441,000 fewer total tons of exported recyclable materials from California ports in 2017, a reduction of approximately 3 percent. Vessel value increased by approximately \$550 million USD, largely due to increases in the export of ferrous metals.

Detailed graphics representing the total exports from California ports are provided in Appendix 1. Detailed graphics representing the exports of specific material categories are provided in Appendix 2. Detailed graphics representing the exports from the United States are provided in Appendix 3.

While exports to China decreased by 1.2 million tons in 2017 (12 percent), exports to other countries, primarily in Southeast Asia, increased by over 750,000 tons. While exports to other countries had a net increase, specific material types overall had a significant decline in exports. For example, California ports exported approximately 1.2 million fewer tons of OCC and kraft paper, unsorted mixed paper, and other miscellaneous mixed paper in 2017 than in 2016.

Tables 2 and 3 provide a summary of the recyclable materials categories exported from California ports in 2017. Recyclable material exports from California ports have been declining since 2011. Table 2 provides the difference in vessel value and tonnage of these recyclable materials categories exported in 2011 and 2017. Table 3 provides the difference in vessel value and tonnage of these recyclable materials categories exported in 2016 and 2017.

*Table 2: Summary of 2011 and 2017 Recyclable Materials Exports from California Ports*

<b>Material Category</b>	<b>2011 Tons</b>	<b>2017 Tons</b>	<b>Tonnage Change (tons)</b>	<b>Vessel Value 2011 (USD)</b>	<b>Vessel Value 2017 (USD)</b>	<b>Vessel Value Change (USD)</b>
OCC and kraft paper	5,367,398	4,343,279	-1,024,118	749,920,092	644,878,861	-105,041,231
unsorted mixed paper	2,439,313	1,501,873	-937,440	400,444,032	180,791,187	-219,652,845
other misc. paper	3,182,789	1,906,164	-1,276,624	529,017,412	321,288,791	-207,728,621
ferrous metal	8,107,635	4,620,382	-3,487,253	3,715,087,413	1,498,613,413	-2,216,474,000
non ferrous metal	1,650,687	1,056,894	-593,793	3,791,939,825	2,010,162,292	-1,781,777,533
aluminum cans*	23,632	1,149	-22,482	28,893,912	1,643,690	-27,250,222
plastics 1 and 2	493,278	390,309	-102,968	185,044,572	120,618,767	-64,425,805
mixed plastics 3-7	753,888	400,654	-353,235	327,479,850	110,124,740	-217,355,110
worn clothing	130,899	137,182	6,283	85,216,418	99,498,911	14,282,493
high grade paper	118,632	95,803	-22,828	32,590,866	22,404,346	-10,186,520
tires/ rubber	74,096	33,945	-40,151	27,335,578	10,477,470	-16,858,108
used Oil and grease	187	31,248	31,061	109,559	6,608,760	6,499,201
batteries	16,095	29,776	13,682	15,895,671	34,124,865	18,229,194
copper wire	17,437	11,406	-6,031	124,397,699	57,531,975	-66,865,724
glass	2,514	2,362	-152	1,230,401	2,243,968	1,013,567
<b>Total All Recyclable Material</b>	<b>22,359,327</b>	<b>14,563,621</b>	<b>-7,795,706</b>	<b>9,987,621,858</b>	<b>5,120,386,120</b>	<b>-4,867,235,738</b>

Note: The total of all recyclable materials includes material types not included in the selected material categories listed in the table.

\* Note: Aluminum cans are also included in the tonnage and value for non ferrous metals.

*Table 3: Summary of 2016 and 2017 Recyclable Materials Exports from California Ports*

<b>Material Category</b>	<b>2016 Tons</b>	<b>2017 Tons</b>	<b>Tonnage Change (tons)</b>	<b>Vessel Value 2016 (USD)</b>	<b>Vessel Value 2017 (USD)</b>	<b>Vessel Value Change (USD)</b>
OCC and kraft paper	5,025,603	4,343,279	-682,323	703,392,938	644,878,861	-58,514,077
unsorted mixed paper	1,757,696	1,501,873	-255,823	204,297,721	180,791,187	-23,506,534
other misc. paper	2,126,125	1,906,164	-219,960	338,084,395	321,288,791	-16,795,604
ferrous metal	3,834,685	4,620,382	785,697	1,077,423,596	1,498,613,413	421,189,817
non ferrous metal	969,520	1,056,894	87,374	1,763,861,026	2,010,162,292	246,301,266
<i>aluminum cans*</i>	1,649	1,149	-500	2,618,475	1,643,690	-974,785
plastics 1 and 2	465,563	390,309	-75,253	146,455,664	120,618,767	-25,836,897
mixed plastics 3-7	521,612	400,654	-120,958	142,156,131	110,124,740	-32,031,391
worn clothing	130,081	137,182	7,101	96,007,127	99,498,911	3,491,784
high grade paper	95,106	95,803	698	21,298,599	22,404,346	1,105,747
tires/ rubber	23,929	33,945	10,016	7,945,230	10,477,470	2,532,240
used oil and grease	19,339	31,248	11,909	2,979,461	6,608,760	3,629,299
batteries	21,508	29,776	8,268	23,671,248	34,124,865	10,453,617
copper wire	8,932	11,406	2,474	40,959,146	57,531,975	16,572,829
glass	111	2,362	2,251	943,947	2,243,968	1,300,021
<b>Total All Recyclable Material</b>	<b>15,004,616</b>	<b>14,563,621</b>	<b>-440,995</b>	<b>4,571,370,106</b>	<b>5,120,386,120</b>	<b>549,016,014</b>

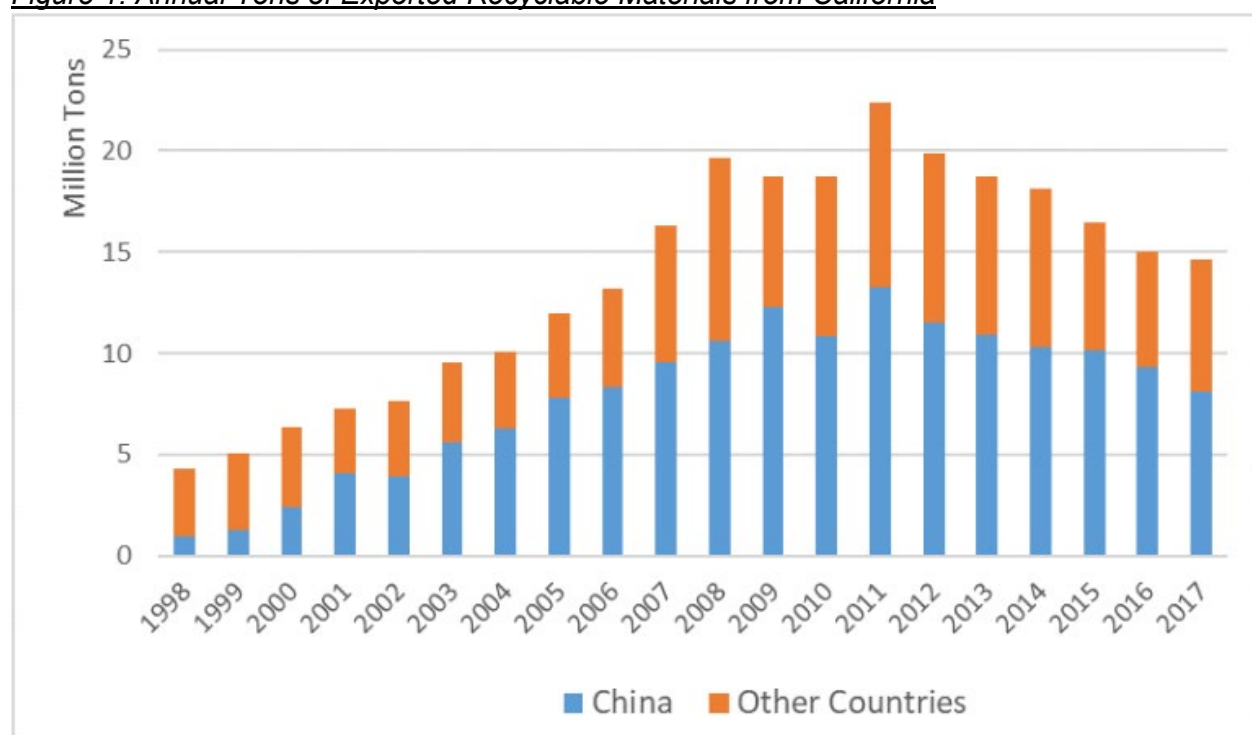
Note: The total of all recyclable materials includes material types not included in the selected material categories listed in the table.

\* Note: Aluminum cans are also included in the tonnage and value for non ferrous metals.

# International Recycling Market Trends

The export of baled recyclable materials is a key component of California's recycling infrastructure. CalRecycle estimates that California annually exports a third of all recyclable materials generated to foreign markets. As shown in Figure 1, California recyclable materials exports have been steadily declining since 2011. There were over 22 million tons of exported recyclable materials in 2011, compared to 14.6 million tons in 2017, a decline of over 34 percent. The vessel value of this material has dropped nearly \$5 billion dollars since 2011. U.S. recyclable materials exports have generally been in decline since 2011, similar to the California trend. Southeast Asian countries are the primary recipients of these recyclable materials exports.

*Figure 1: Annual Tons of Exported Recyclable Materials from California*



From WISERTrade<sup>1</sup>

## China Policy Changes

Since 2001, China has been the most significant recipient of exported recyclable materials from California ports. In 2017, China received 56 percent of California's exported recyclable materials. China is also the largest recipient—by a significant margin—of all recyclable materials exported from the United States. As a result, policy changes in China regarding the import of recyclable materials significantly impacts California's recycling exports, as well as recycling exports across the United States.

China has made it clear that they want to improve their environment by increasing the recycling of domestic recyclable materials and reducing the recycling of imported

contaminated materials. One of their goals is the reduction of pollution resulting from the processing of recyclable materials with high levels of contamination. Prior attempts to reduce pollution, such as the Green Fence policy (enacted in February 2013), and various crackdowns on processing permits in 2015, were only partially successful in meeting this goal (see Figure 2). As China takes greater responsibility for their environment, so must we take even greater responsibility for developing a robust recycling infrastructure within our state.

In February 2017, China announced the National Sword policy<sup>2</sup> to bolster enforcement of illegal smuggling operations of contaminated recyclable commodities. The policy preceded China's announcement to the World Trade Organization (WTO) that signaled China's intention to prohibit the import of 24 categories of recyclable materials, including post-consumer plastics and unsorted mixed paper.<sup>3</sup> The world now refers to China's suite of stringent inspection standards and enforcement as National Sword.

The materials prohibited by the WTO filing include, but are not limited to:

- Waste textile materials
- Slag, dross (other than granulated slag), scalings, and other waste from the manufacture of iron or steel
- Ash and residues (other than from the manufacture of iron or steel), containing arsenic, metals, or their compounds
- Plastic waste, parings and scrap
- Other paper, including unsorted waste and scrap

The notice also increased enforcement and limited contamination rates to 0.3 percent for allowable recyclable materials. Subsequently, after reviewing comments from trade partners and industry, China increased the allowable contamination rate to 0.5 percent for most materials. The imposition of tighter quality standards on all scrap imports began on March 1, 2018.<sup>4</sup> China enacted National Sword and other related policies to reduce the environmental impacts of recyclable materials imports.<sup>5</sup>

This policy announcement caused significant disruptions to recyclable materials exports from California in 2017. Anecdotal statements from the California recycling industry, prior to National Sword going into effect, indicated that export contracts were not being renewed for certain materials in anticipation of the WTO ban and contamination limit.<sup>6</sup>

China is continuing to escalate policies that regulate the contamination levels and material types being imported into the country. In Mid-March 2018, China began the Blue Sky 2018 enforcement campaign to prevent the import of banned recyclable materials. Additional banned materials announced in April 2018 include:

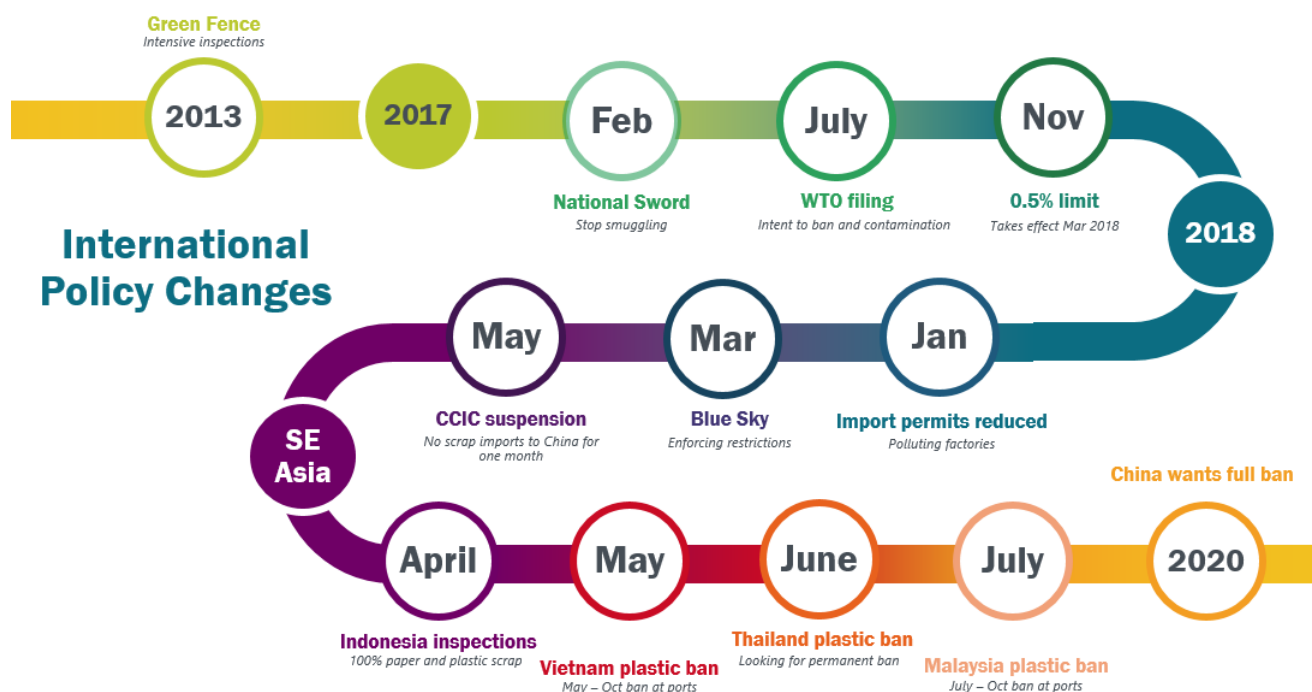
- By end of 2018: steel slag, post-industrial plastics (such as PE, PET, PS, and PVC), compressed auto pieces, small electric motors and insulated wires, and vessels

- By end of 2019: wood pellets, stainless steel scrap, and nonferrous scrap excluding aluminum and copper

China has made other efforts to limit unwanted waste from entering their country, including reducing import permits in January 2018 and suspending all imports into China for almost all of May. China's policy changes have potentially significant impacts on California's economy and California's broader environmental goals as they relate to material recovery and recycling. China is planning to establish a complete ban of scrap materials by 2020.

These policy changes have caused exporters to shift their recyclable materials to other markets. Consequently, Southeast Asian countries increased their recyclable imports. This caused backlogs in ports and processing locations of the importing countries. In 2018, additional countries started to impose their own temporary bans or restrictions on paper and plastics. Indonesia increased inspections of scrap paper and plastics in April. Vietnam imposed a temporary ban on plastic from June through October. Thailand set a temporary plastic ban in June. Malaysia also put in place a temporary ban on plastic for three months beginning in July.

*Figure 2: China Recyclable Materials Import Policies Timeline*

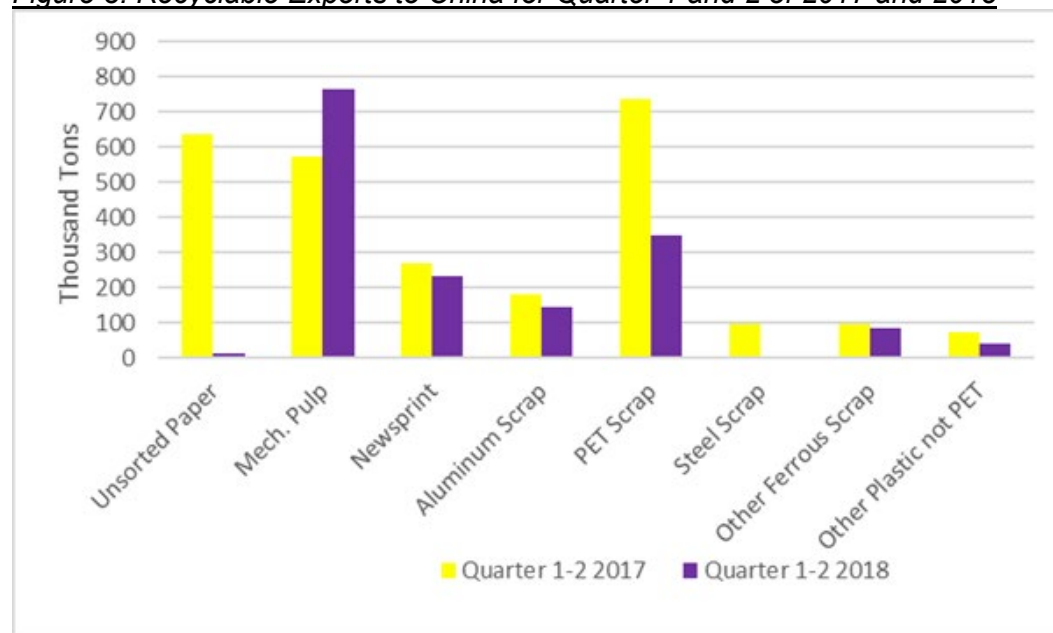


## 2018 Snapshot of International Recycling Markets

In order to monitor the impacts of the National Sword policy on California, CalRecycle collected data from early 2018 California seaborne recyclable materials exports. As

shown in Figure 3, specific recyclable commodities exported to China through California ports have been significantly reduced. January through June of 2018 saw a dramatic decrease in unsorted paper exports to China when compared with the same period in 2017. Although other countries have been importing more of these materials, the surplus created by China's policy changes is not being fully absorbed by growth in other recycling markets.

*Figure 3: Recyclable Exports to China for Quarter 1 and 2 of 2017 and 2018*



From WISERTrade<sup>1</sup>

### ***Looking beyond 2018***

As indicated in Figure 2, other countries in Southeast Asia are also considering policy changes regarding import of recyclable scrap material<sup>7</sup>. Indonesia, Malaysia, Thailand and Vietnam are pursuing policy changes to increase inspections and reduce import permits.

Countries which have historically received significant amounts of California recyclable materials exports are now pursuing their own environmental protection driven policy changes that will continue to impact global recycling markets.<sup>8</sup> This trend to increase inspections and restrict the import of recyclable materials will likely continue on the international market.



# Conclusions

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Recyclable materials exported from California ports decreased by nearly 441,000 tons in 2017 compared to 2016, a 3 percent decline.

China continues to be the largest recipient of recyclable materials exported from California ports. China received 56 percent of California's seaborne recyclable exports in 2017. Recyclable materials exported to China declined by approximately 1.2 million tons, primarily due to a reduction in unsorted mixed paper exports.

However, China's policies regarding the import of recyclable materials are becoming progressively more stringent. The policies call for more restrictions on material types and lower permissible contamination levels. This has led to a reduction in export tonnages of specific material types from California ports to China. While some other countries increased recyclable materials imports, they have not completely absorbed the surplus created by reduced exports to China. At the same time, some countries are following China's example and are restricting material imports.

Looking further back, recyclable material exports from California ports have been declining since 2011. Unless new global markets develop, it is likely that international import restrictions will continue to reduce the total exported recyclable materials from California ports. Recycling in California has a strong collection and sorting infrastructure with domestic markets for only some of the recyclable materials we generate. International export of recyclable materials generated in California make up a significant portion of California's statewide recycling rate and, as a result, declines in international markets present a serious obstacle in meeting mandated diversion targets.

California ports accounted for 40 percent of the total recyclable materials exports from the U.S. in 2017. Changes and challenges to California's international recyclable materials exports are representative of challenges faced by the entire country. California has been a national leader in environmental policy and innovation and continues to address the most complex issues that threaten public health and safety and hasten climate change. As California adapts to a new era of recycling management, the state has an opportunity to further demonstrate leadership in creating solutions to a fluctuating and ever-changing global recycling commodities market. The 2017 California State of Recycling and Disposal Report provides a more in-depth discussion of how changes in recyclable material exports impact California's recycling landscape.

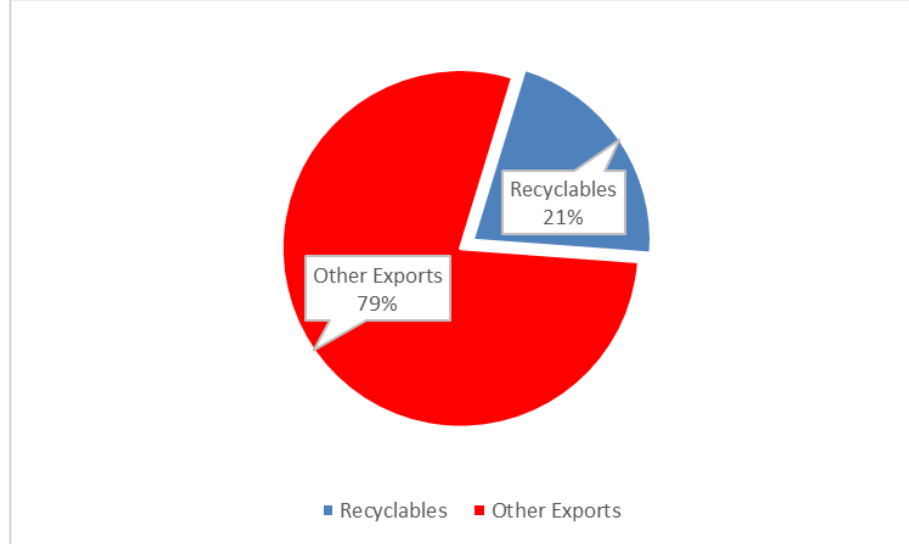
CalRecycle will continue to monitor recyclable material exports. If you have data or insights on these issues, please contact CalRecycle's Knowledge Integration Section.

# Appendix 1: 2017 California Seaborne Exports

## ***Total Seaborne Exports - Commodities by Weight***

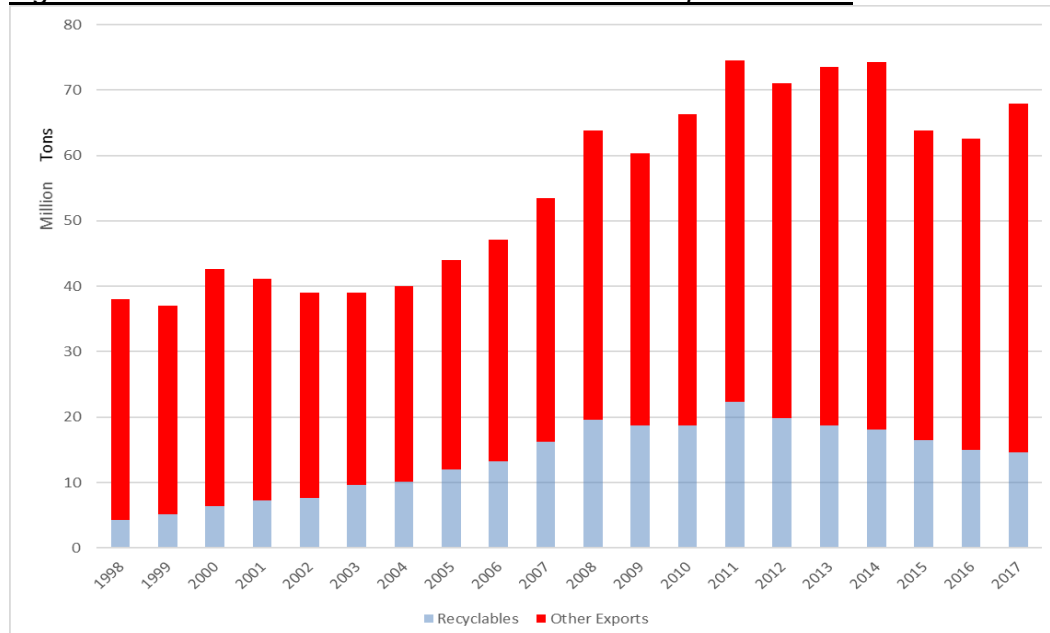
Recyclables	Other Commodities	Total All Commodities
14.6 million tons	53.4 million tons	68 million tons

***Figure 4: 2017 Total California Seaborne Exports by Weight (Total: 68 Million Tons)***



From WISERTrade<sup>1</sup>

***Figure 5: 1998 to 2017 Total California Seaborne Exports Trends***

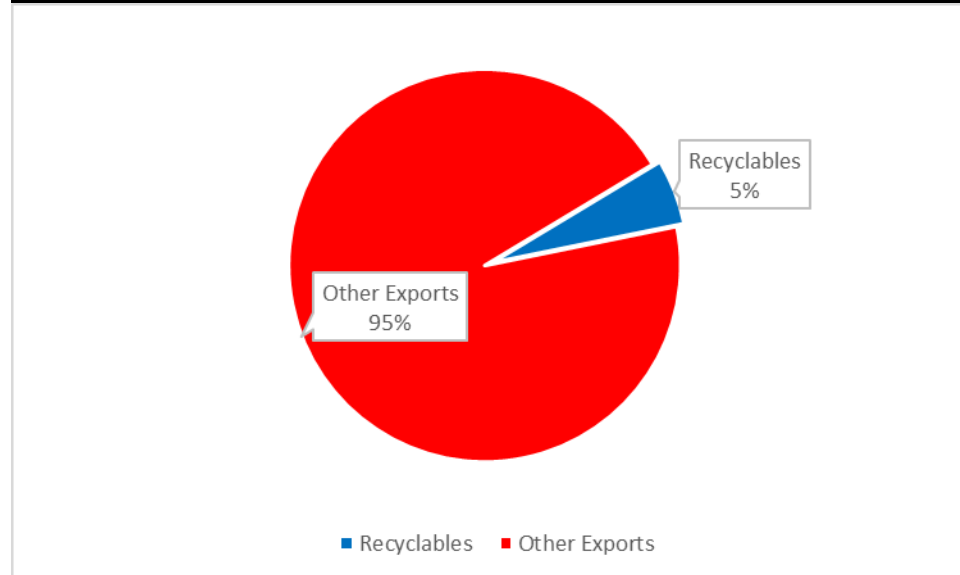


From WISERTrade<sup>1</sup>

### **Total Seaborne Exports - Commodities by Vessel Value**

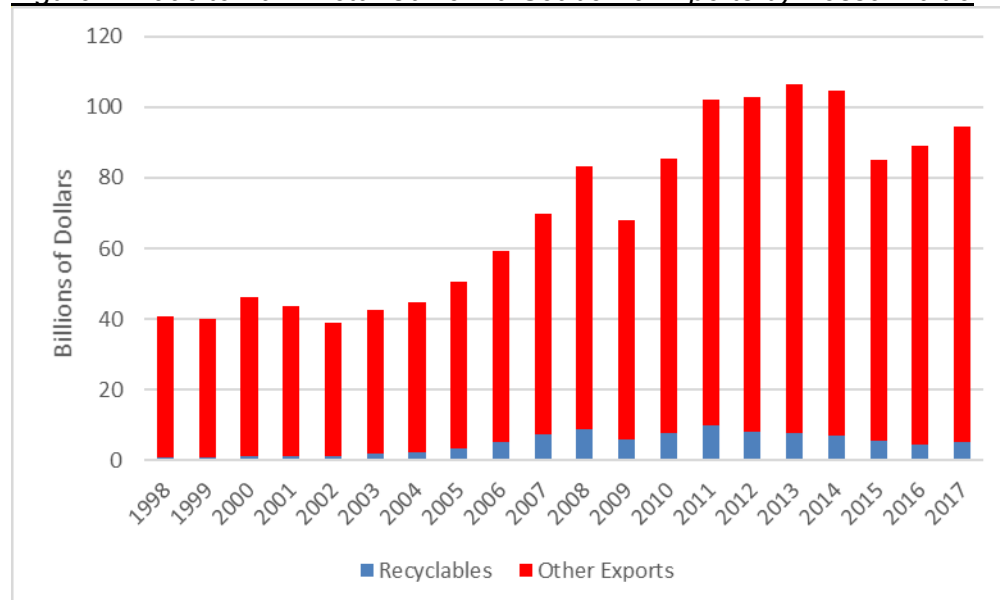
Recyclables	Other Commodities	Total All Commodities
\$5.1 billion	\$89.4 billion	\$94.5 billion

**Figure 6: 2017 Total California Seaborne Exports by Vessel Value (Total Value: \$94.5 Billion)**



From WISERTrade<sup>1</sup>

**Figure 7: 1998 to 2017 Total California Seaborne Exports by Vessel Value**



From WISERTrade<sup>1</sup>

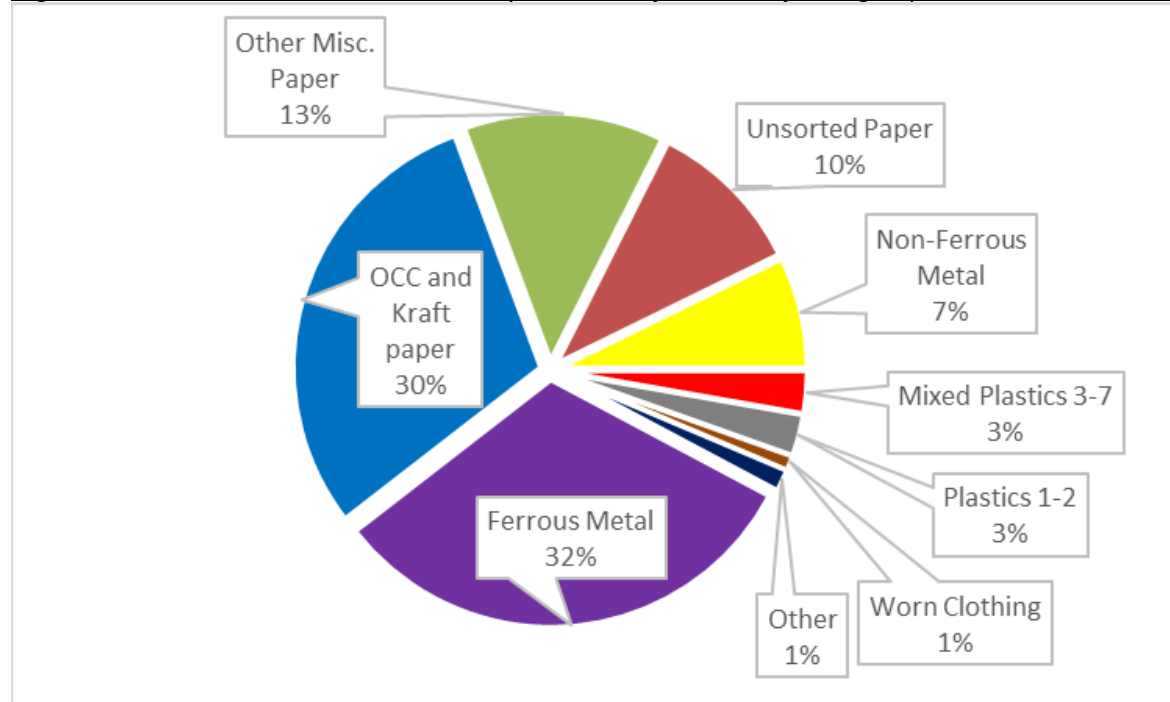
### Total Seaborne Exports - Recyclables by Material Category

Material	Weight*	Value**	Material	Weight*	Value**
OCC and Kraft paper	30%	13%	Worn Clothing	1%	2%
Unsorted Paper	10%	4%	High Grade Paper	<1%	<1%
Other Misc. Paper	13%	6%	Tires / Rubber	<1%	<1%
Ferrous Metal	32%	29%	Copper Wire	<1%	<1%
Non-Ferrous Metal	7%	39%	Batteries	<1%	<1%
Mixed Plastics 3-7	3%	2%	Glass	<1%	<1%
Plastics 1-2	3%	2%	Used Oil / Grease	<1%	<1%

\* Percent of California Seaborne Exported Recyclables by Weight

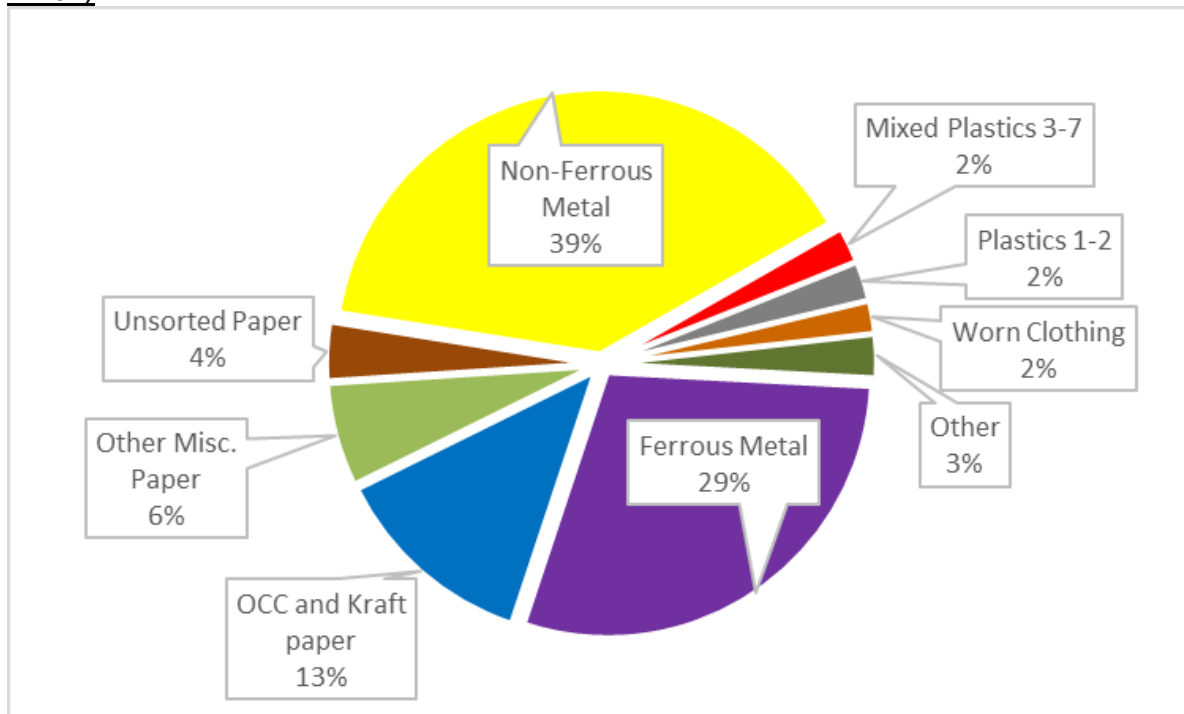
\*\* Percent of California Seaborne Exported Recyclables by Vessel Value

**Figure 8: 2017 California Seaborne Exported Recyclables by Weight (Total: 14.6 Million Tons)**



From WISERTrade<sup>1</sup>

***Figure 9: 2017 California Seaborne Exported Recyclables by Vessel Value (Total Value: \$5.1 Billion)***

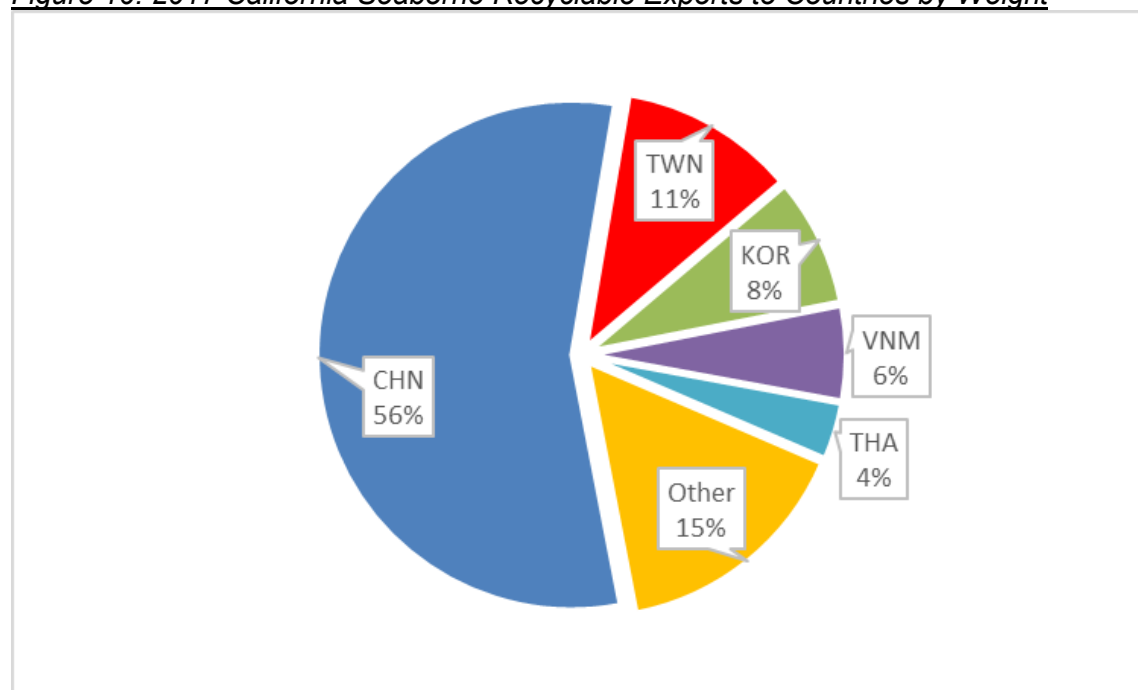


From WISERTrade<sup>1</sup>

**Total Seaborne Exports - Recyclables by Destination Country (Weight) (Total: 14.6 Million Tons)**

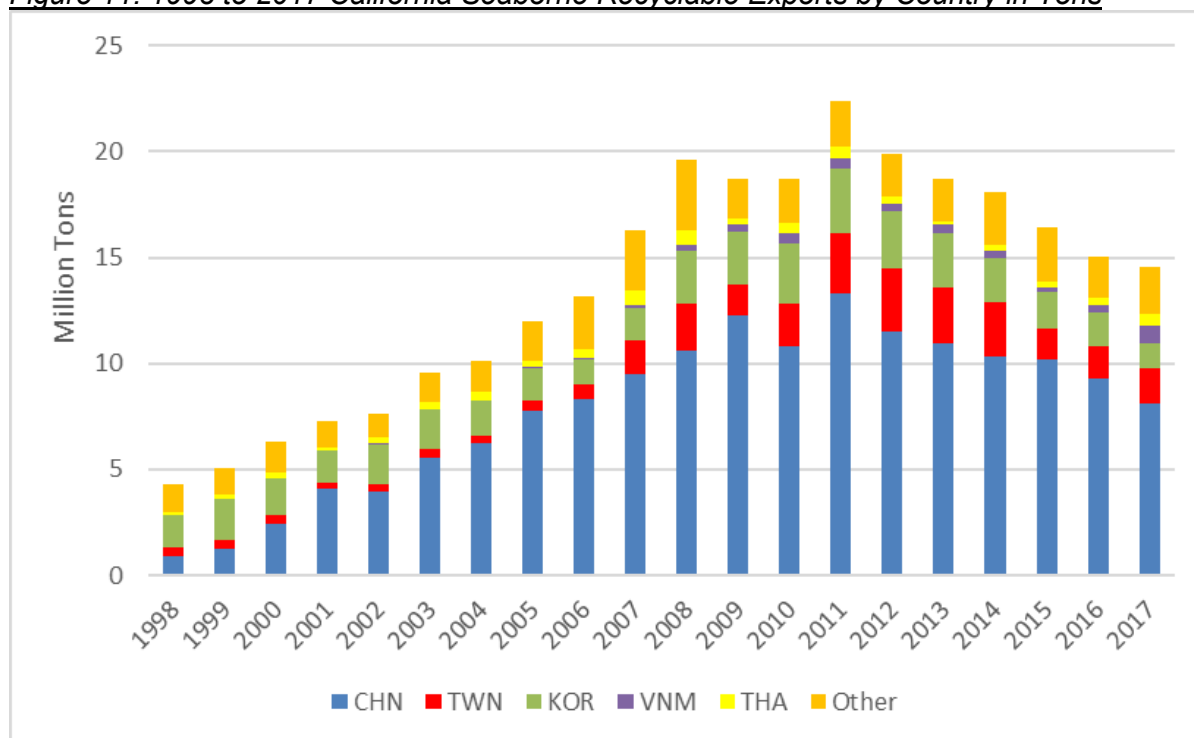
Top 10 Countries	Total Tons	Tonnage Change 2016 to 2017	Percent of Recyclables	Percent Change from 2016
China (CHN)	8.1 million	-1.2 million	56%	-12%
Taiwan (TWN)	1.6 million	68 thousand	11%	4%
Korea (KOR)	1.2 million	-429 thousand	8%	-27%
Vietnam (VNM)	870 thousand	529 thousand	6%	155%
Thailand (THA)	519 thousand	160 thousand	4%	45%
Hong Kong (HKG)	310 thousand	-182 thousand	2%	-37%
Bangladesh (BGD)	276 thousand	57 thousand	2%	26%
India (IND)	251 thousand	88 thousand	2%	54%
Malaysia (MYS)	240 thousand	172 thousand	1%	253%
Indonesia (IDN)	205 thousand	81 thousand	1%	65%

**Figure 10: 2017 California Seaborne Recyclable Exports to Countries by Weight**



From WISERTrade<sup>1</sup>

*Figure 11: 1998 to 2017 California Seaborne Recyclable Exports by Country in Tons*

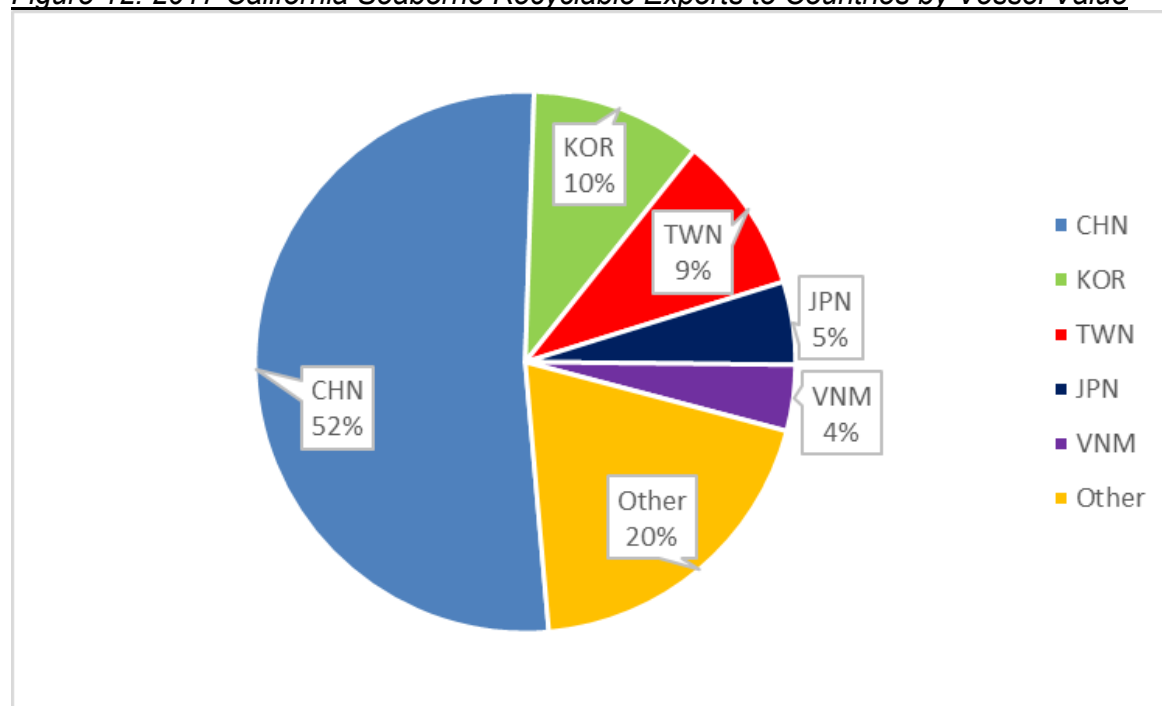


From WISERTrade<sup>1</sup>

**Total Seaborne Exports - Recyclables by Destination Country (Vessel Value) (Total Value: \$5.1 Billion)**

Top 10 Countries	Total Vessel Value (\$)	Vessel Value Change 2016 to 2017	Percent of Recyclables	Percent Change 2016 to 2017
China (CHN)	\$2.7 billion	\$148 million	52%	6%
Korea (KOR)	\$523 million	\$6 million	10%	1%
Taiwan (TWN)	\$485 million	\$64 million	9%	15%
Japan (JPN)	\$254 million	\$6 million	5%	2%
Vietnam (VNM)	\$202 million	\$128 million	4%	174%
Hong Kong (HKG)	\$151 million	\$-39 million	2%	-20%
Thailand (THA)	\$124 million	\$60 million	2%	92%
India (IND)	\$102 million	\$32 million	2%	45%
Malaysia	\$78 million	\$49 million	1%	168%
Bangladesh	\$69 million	\$27 million	1%	63%

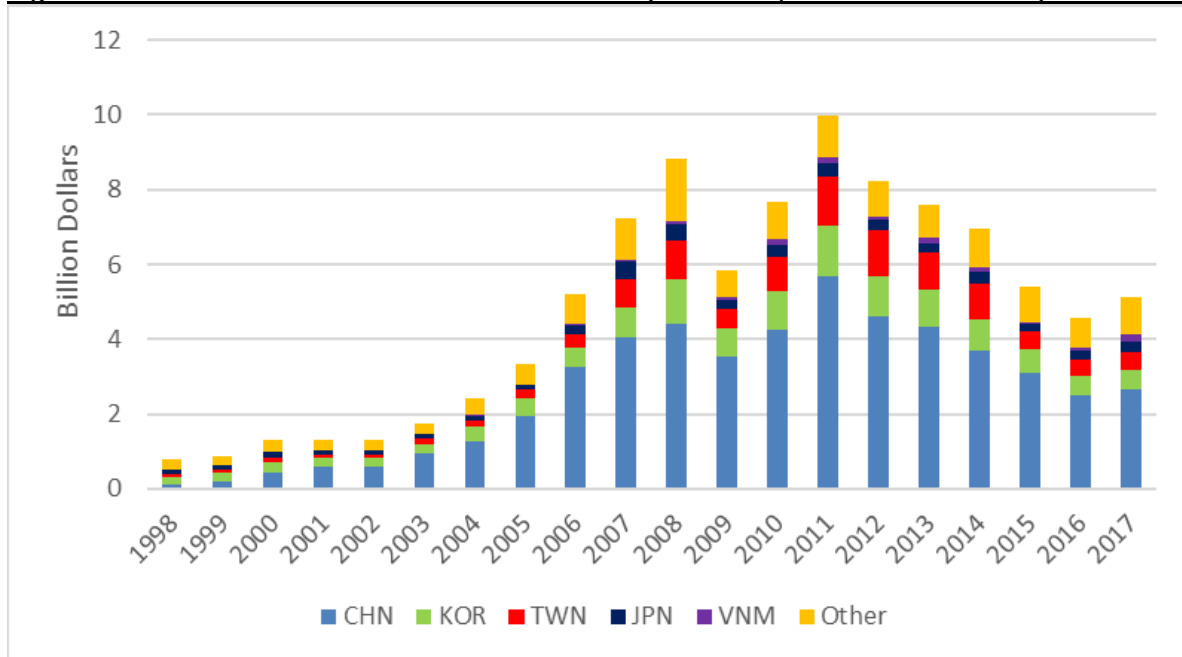
**Figure 12: 2017 California Seaborne Recyclable Exports to Countries by Vessel Value**



From WISERTrade<sup>1</sup>



*Figure 13: 1998 to 2017 California Seaborne Recyclable Exports to Countries by Vessel Value*



From WISERTrade<sup>1</sup>

## Appendix 2: 2017 Seaborne Exports of Individual Recyclable Materials Categories

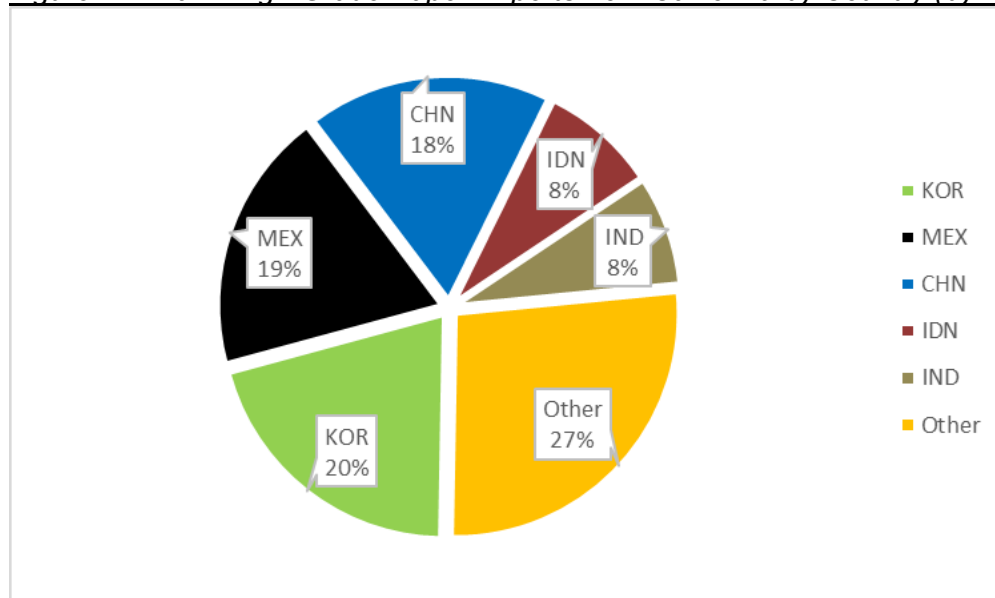
### High-Grade Paper

Year	Tons	Percent Change from 2016	Vessel Value (\$)	Percent Change from 2016
2017	96 thousand*	<1%	\$22 million**	5%

\*Represents 1 percent of recyclable seaborne exports by weight

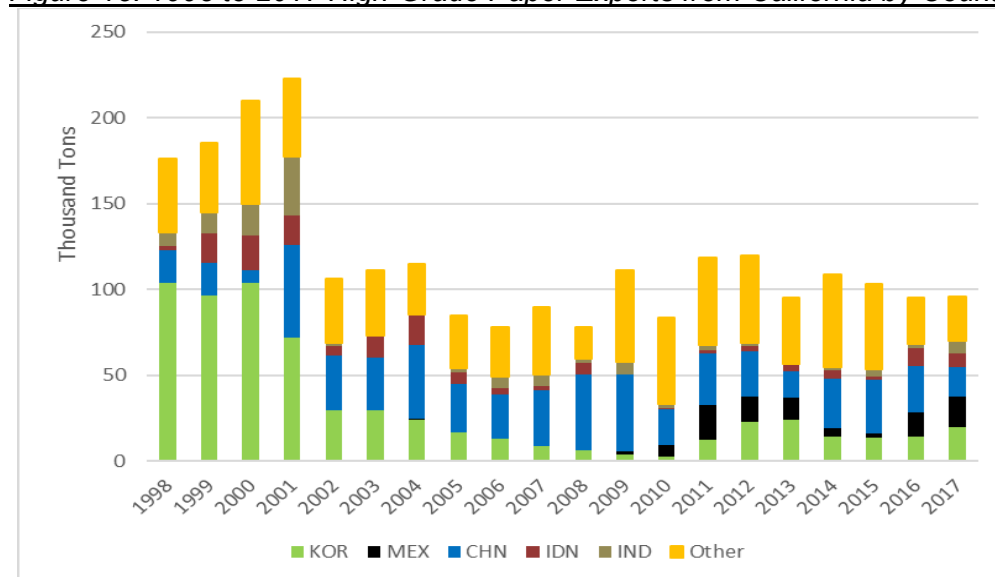
\*\*Represents <1 percent of recyclable seaborne exports by value.

Figure 14: 2017 High-Grade Paper Exports from California by Country (by Weight)



From WISERTrade<sup>1</sup>

Figure 15: 1998 to 2017 High-Grade Paper Exports from California by Country



From WISERTrade<sup>1</sup>

## OCC and Kraft Paper

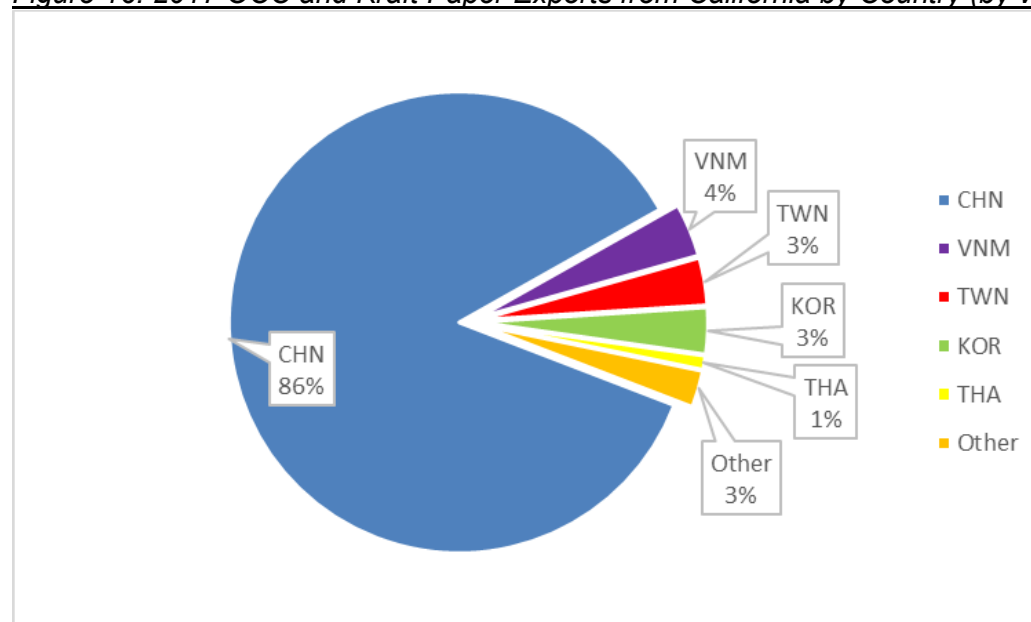
(OCC cardboard and kraft paperboard)

Year	Tons	Percent Change from 2016	Vessel Value (\$)	Percent Change from 2016
2017	4.3 million*	-14%	\$645 million**	-8%

\*Represents 30 percent of recyclable seaborne exports by weight.

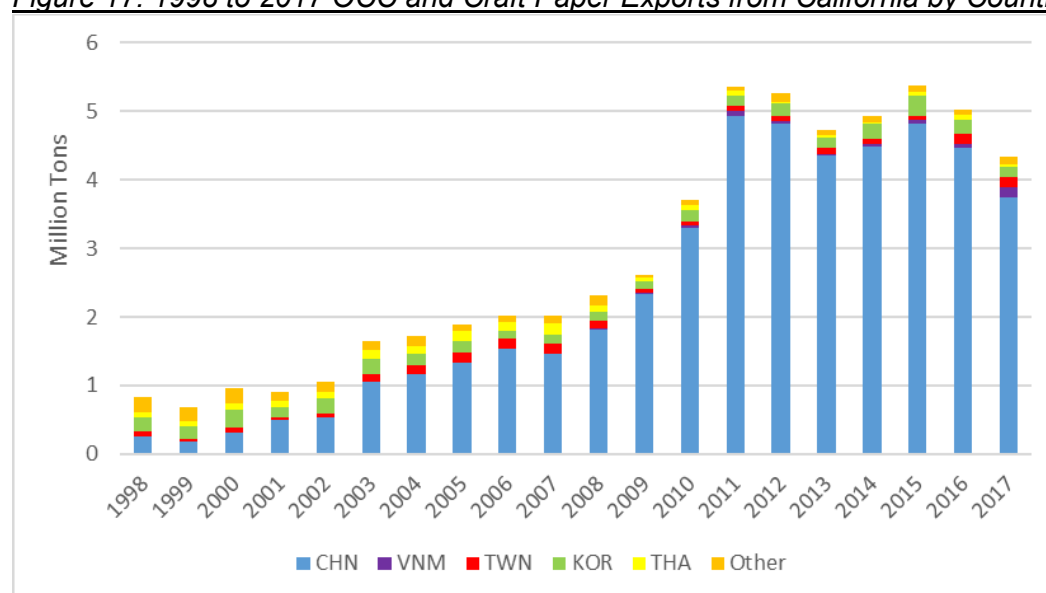
\*\*Represents 13 percent of recyclable seaborne exports by value.

**Figure 16: 2017 OCC and Kraft Paper Exports from California by Country (by Weight)**



From WISERTrade<sup>1</sup>

**Figure 17: 1998 to 2017 OCC and Craft Paper Exports from California by Country**



From WISERTrade<sup>1</sup>

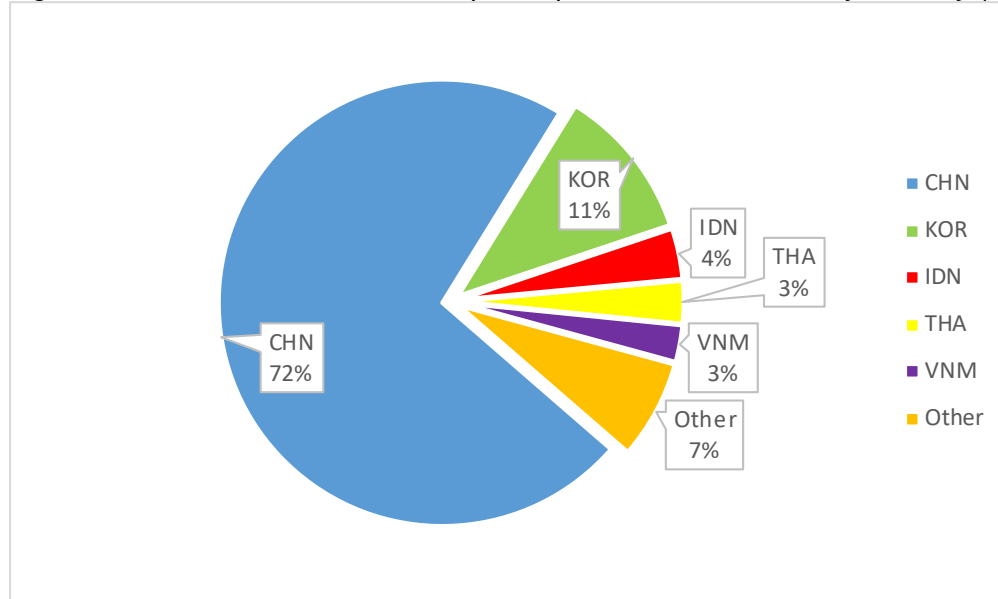
## Unsorted Mixed Paper

Year	Tons	Percent Change from 2016	Vessel Value (\$)	Percent Change from 2016
2017	1.5 million*	-15%	\$180 million**	-12%

\*Represents 10 percent of recyclable seaborne exports by weight.

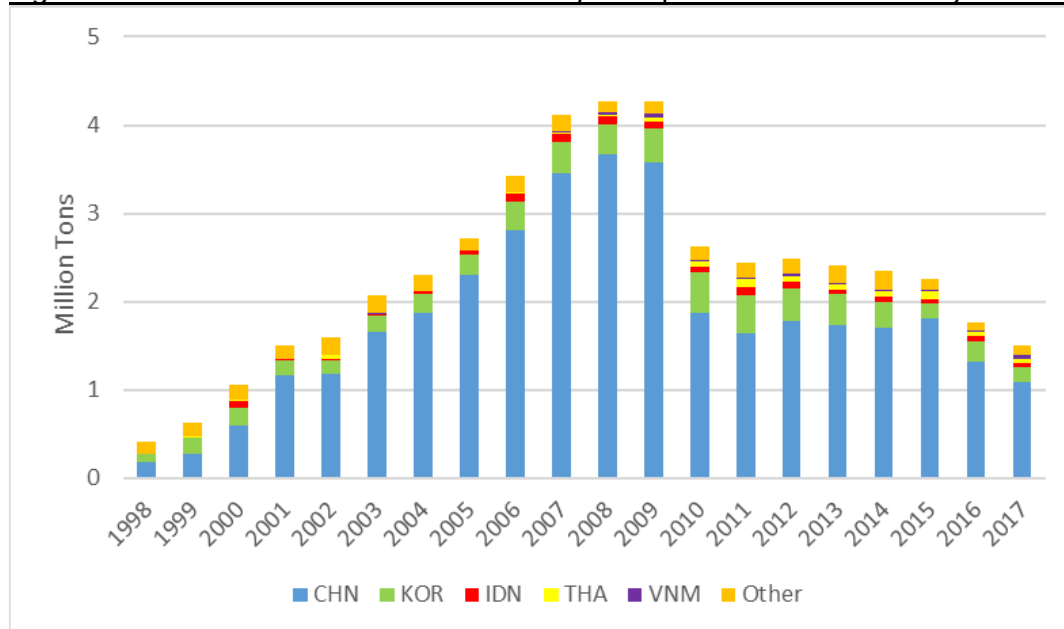
\*\*Represents <4 percent of recyclable seaborne exports by value.

**Figure 18: 2017 Unsorted Mixed Paper Exports from California by Country (by Weight)**



From WISERTrade<sup>1</sup>

**Figure 19: 1998 to 2017 Unsorted Mixed Paper Exports from California by Country**



From WISERTrade<sup>1</sup>

## Other Miscellaneous (Misc.) Mixed Paper

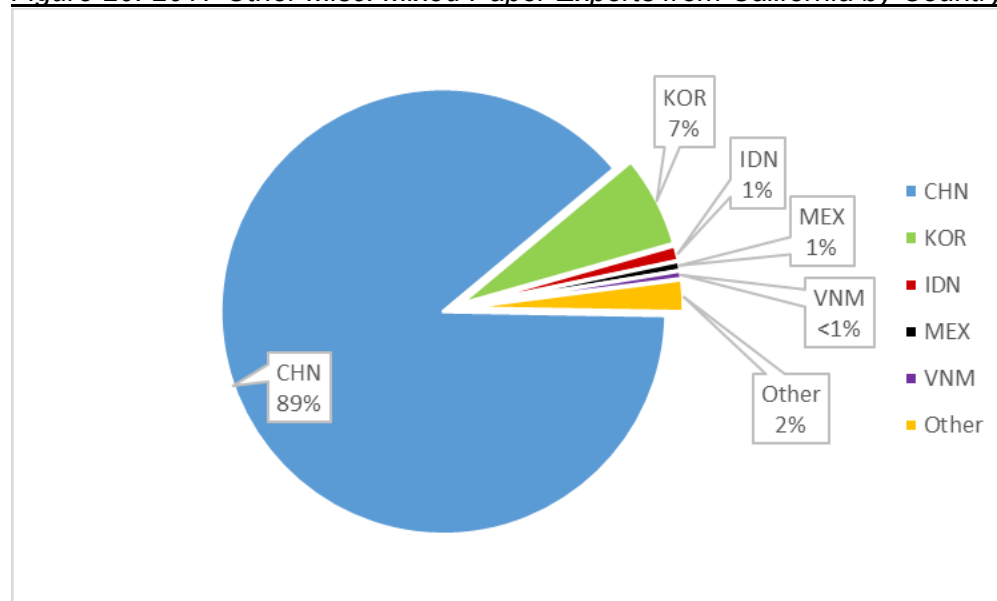
(Mechanical pulp, newsprint, chem pulp fibers of pulp)

Year	Tons	Percent Change from 2016	Vessel Value (\$)	Percent Change from 2016
2017	1.9 million*	-10%	\$321 million**	-5%

\*Represents 13 percent of recyclable seaborne exports by weight.

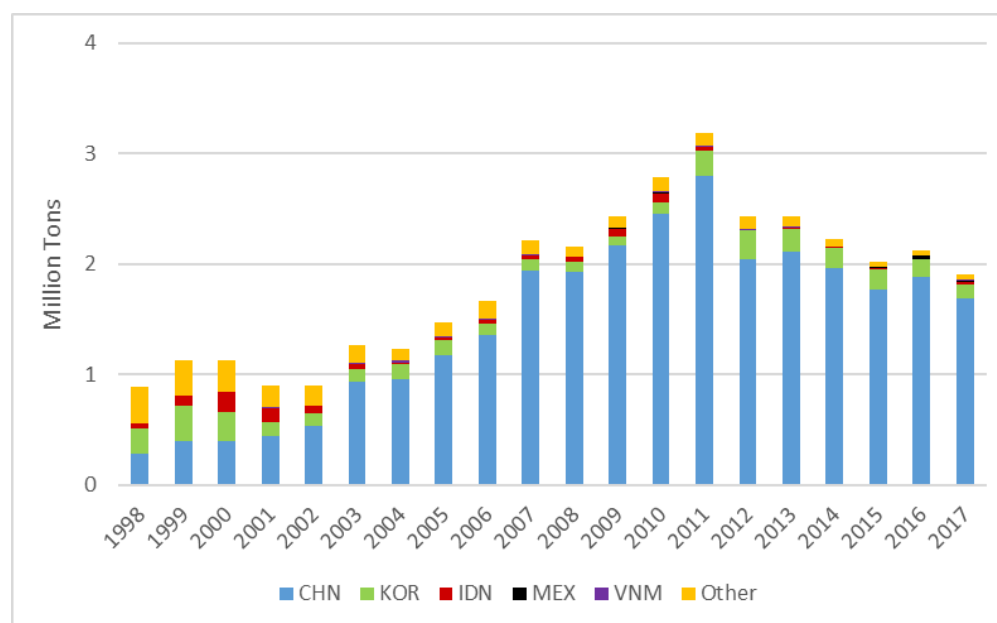
\*\*Represents 6 percent of recyclable seaborne exports by value.

Figure 20: 2017 Other Misc. Mixed Paper Exports from California by Country (by Weight)



From WISERTrade<sup>1</sup>

Figure 21: 1998 to 2017 Other Misc. Mixed Paper Exports from California by Country



From WISERTrade<sup>1</sup>

## Plastics 1 and 2

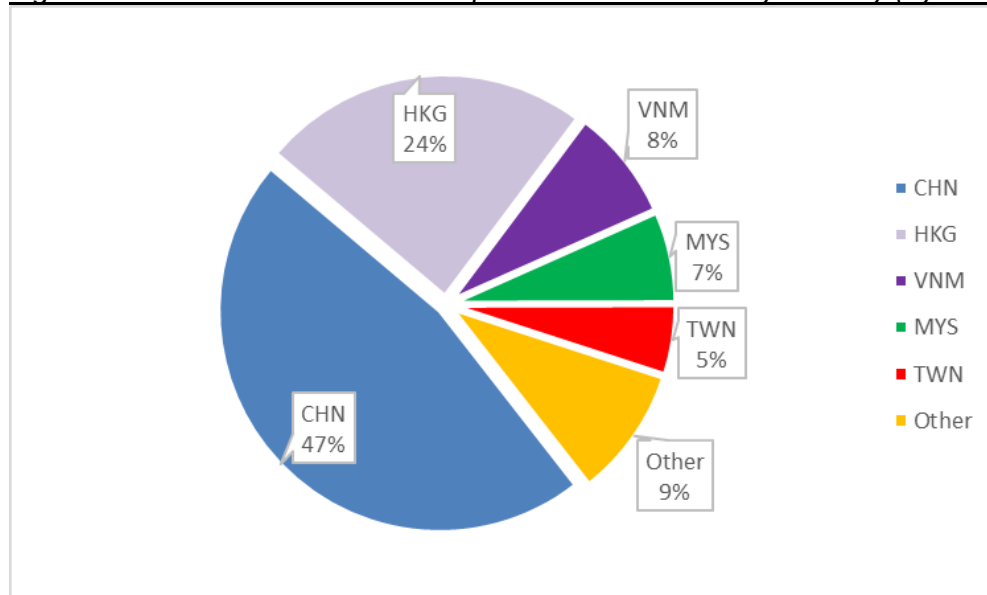
(PET, HDPE)

Year	Tons	Percent Change from 2016	Vessel Value (\$)	Percent Change from 2016
2017	390 thousand*	-16%	\$120 million**	-18%

\*Represents 3 percent of recyclable seaborne exports by weight

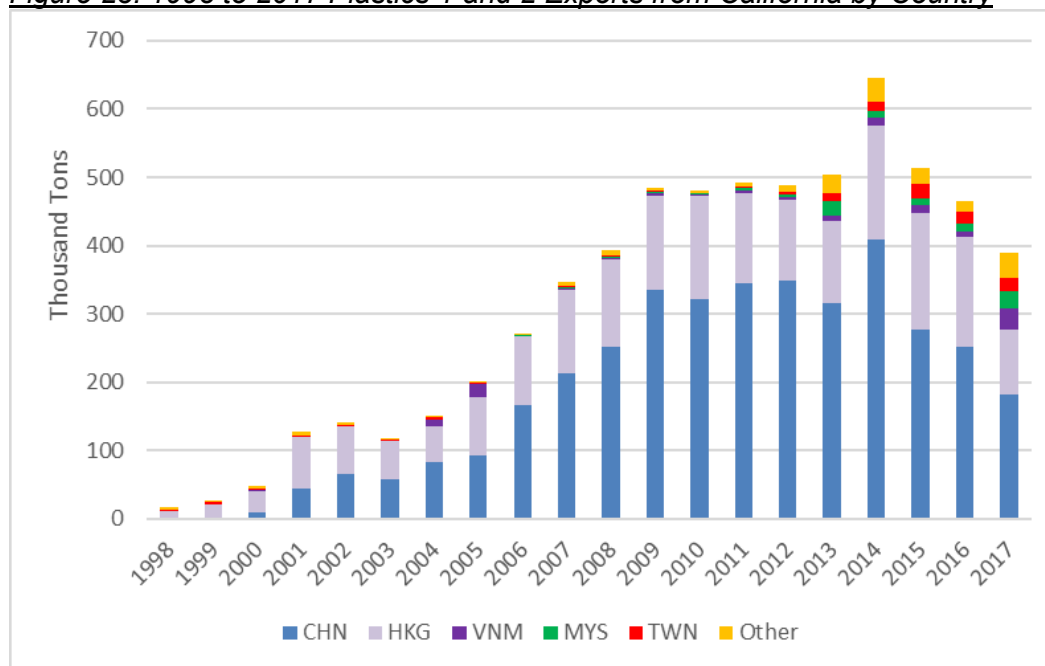
\*\*Represents 2 percent of recyclable seaborne exports by value.

**Figure 22: 2017 Plastics 1 and 2 Exports from California by Country (by Weight)**



From WISERTrade<sup>1</sup>

**Figure 23: 1998 to 2017 Plastics 1 and 2 Exports from California by Country**



From WISERTrade<sup>1</sup>

## Mixed Plastics 3-7

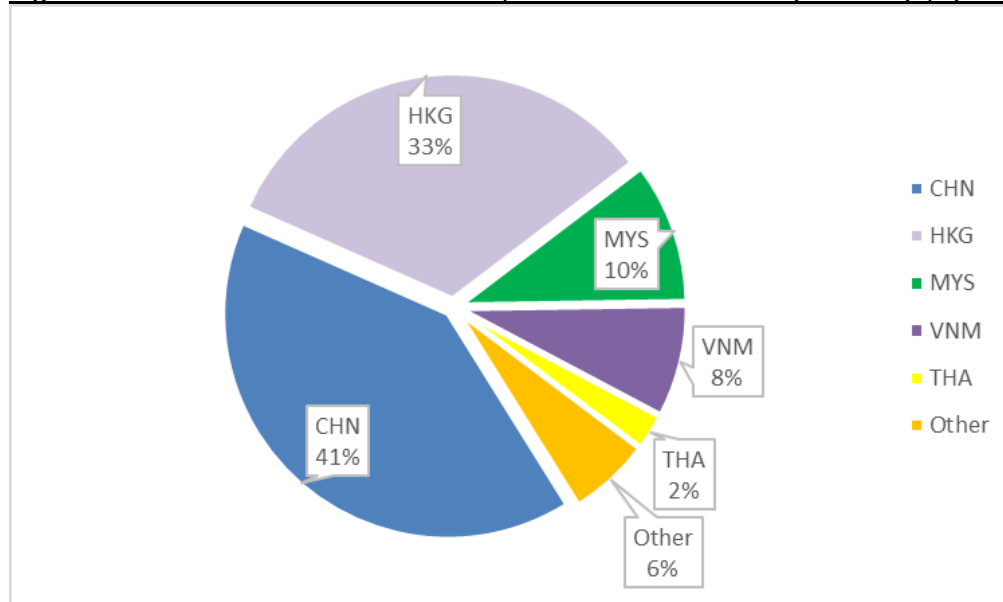
(PVC, Polystyrene, Other)

Year	Tons	Percent Change from 2016	Vessel Value (\$)	Percent Change from 2016
2017	401 thousand*	-23%	\$110 million**	-23%

\*Represents 3 percent of recyclable seaborne exports by weight

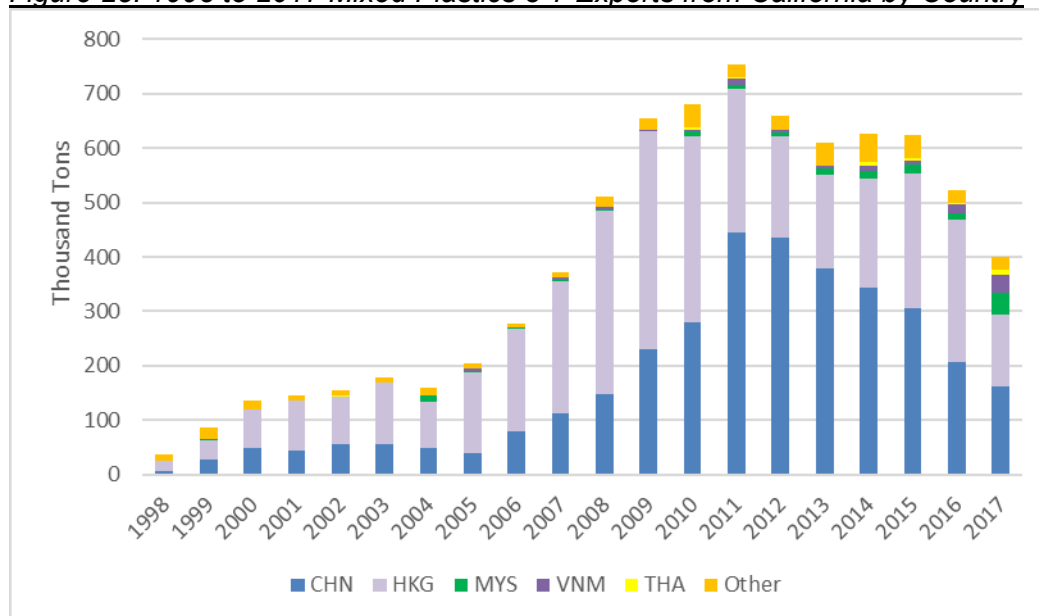
\*\*Represents 2 percent of recyclable seaborne exports by value.

**Figure 24: 2017 Mixed Plastics 3-7 Exports from California by Country (by Weight)**



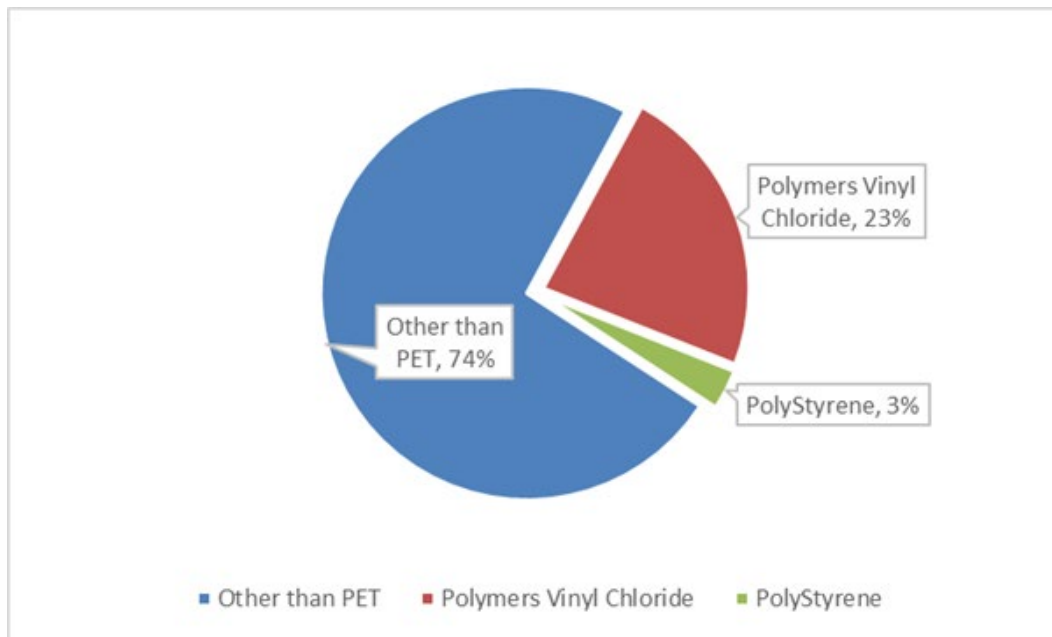
From WISERTrade<sup>1</sup>

**Figure 25: 1998 to 2017 Mixed Plastics 3-7 Exports from California by Country**



From WISERTrade<sup>1</sup>

Figure 26: 2017 Mixed Plastics 3-7 Material Type Breakdown



From WISERTrade<sup>1</sup>



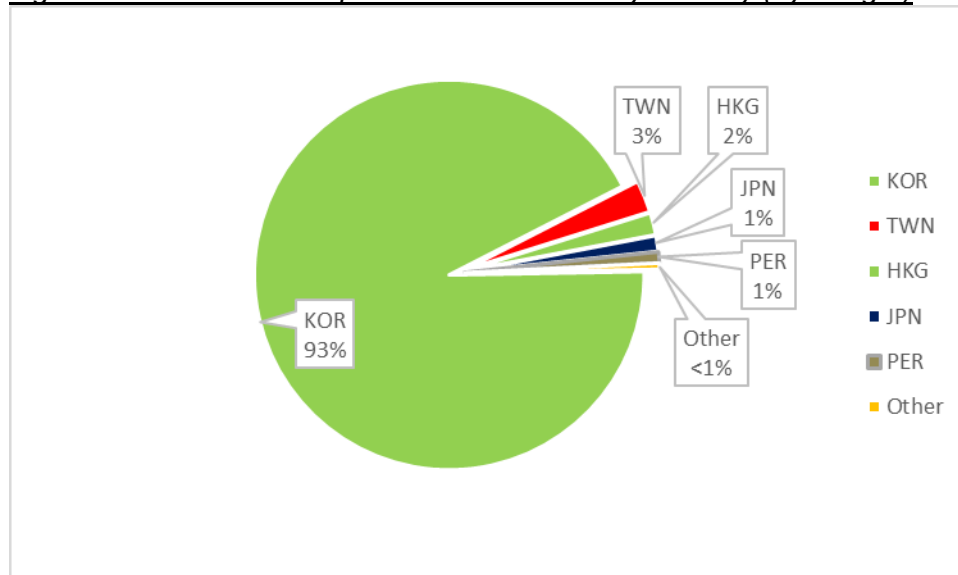
## Glass

Year	Tons	Percent Change from 2016	Vessel Value (\$)	Percent Change from 2016
2017	2.4 thousand*	2023%	\$2.2 million**	138%

\*Represents <1 percent of recyclable seaborne exports by weight

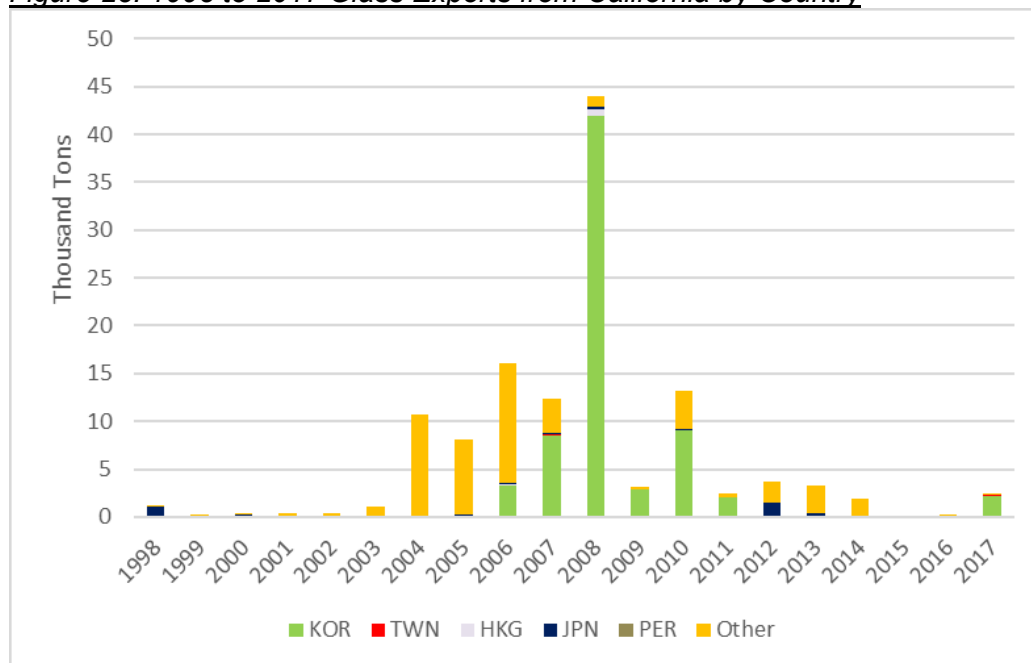
\*\*Represents <1 percent of recyclable seaborne exports by value.

**Figure 27: 2017 Glass Exports from California by Country (by Weight)**



From WISERTrade<sup>1</sup>

**Figure 28: 1998 to 2017 Glass Exports from California by Country**



From WISERTrade<sup>1</sup>

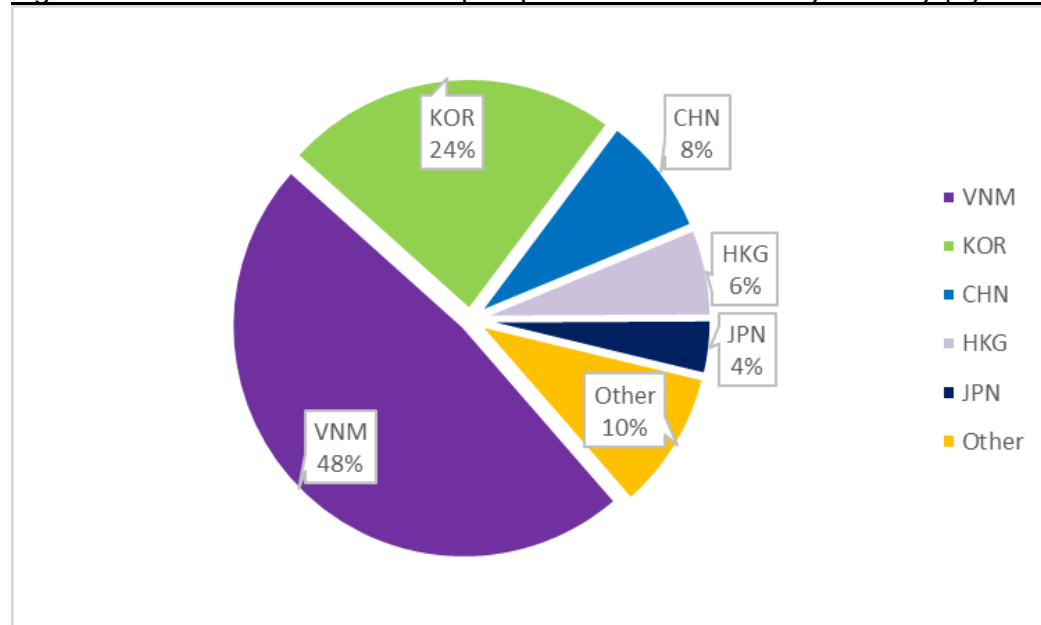
## Tires and Rubber Scrap

Year	Tons	Percent Change from 2016	Vessel Value (\$)	Percent Change from 2016
2017	34 thousand*	42%	\$10 million**	32%

\*Represents <1 percent of recyclable seaborne exports by weight

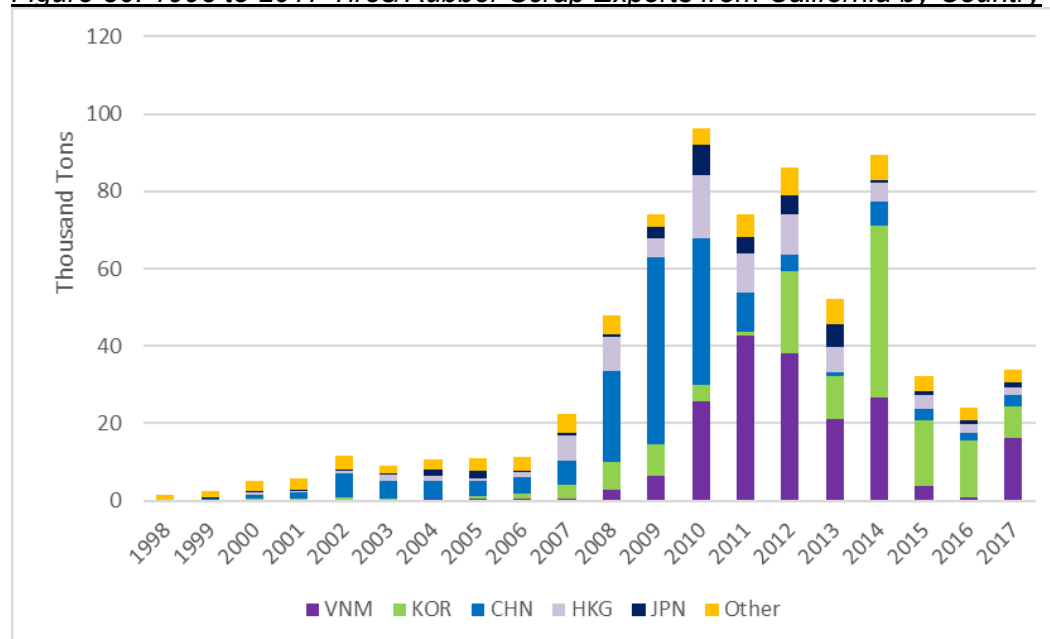
\*\*Represents <1 percent of recyclable seaborne exports by value.

**Figure 29: 2017 Tires/Rubber Scrap Exports from California by Country (by Weight)**



From WISERTrade<sup>1</sup>

**Figure 30: 1998 to 2017 Tires/Rubber Scrap Exports from California by Country**



From WISERTrade<sup>1</sup>

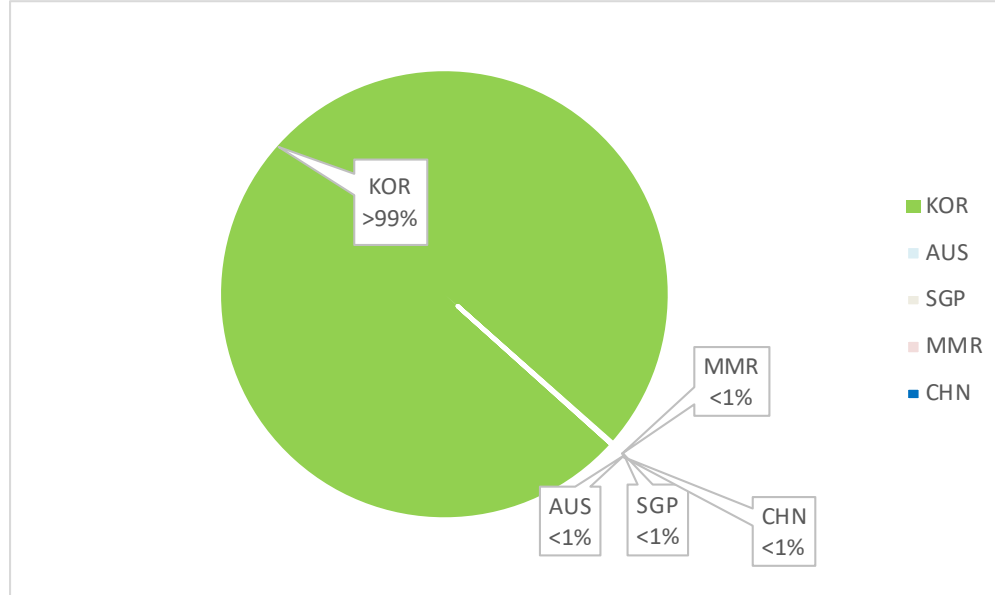
## Used Oil and Grease

Year	Tons	Percent Change from 2016%	Vessel Value (\$)	Percent Change from 2016
2017	31 thousand*	62%	\$6.6 million**	122%

\*Represents <1 percent of recyclable seaborne exports by weight

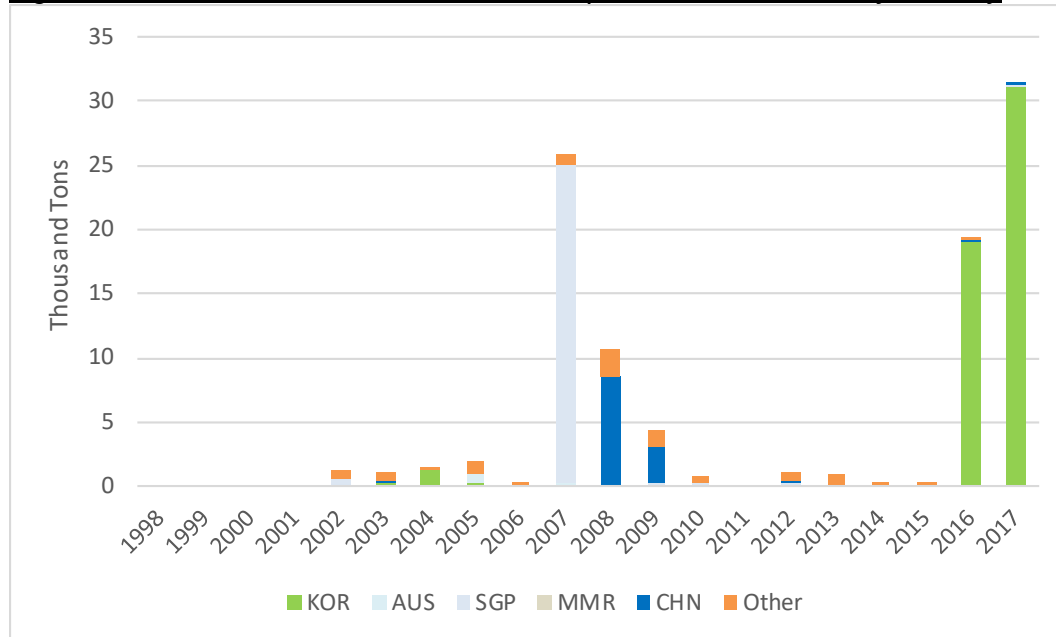
\*\*Represents <1 percent of recyclable seaborne exports by value.

**Figure 31: 2017 Used Oil/Grease Exports from California by Country (by Weight)**



From WISERTrade<sup>1</sup>

**Figure 32: 1998 to 2017 Used Oil/Grease Exports from California by Country**



From WISERTrade<sup>1</sup>

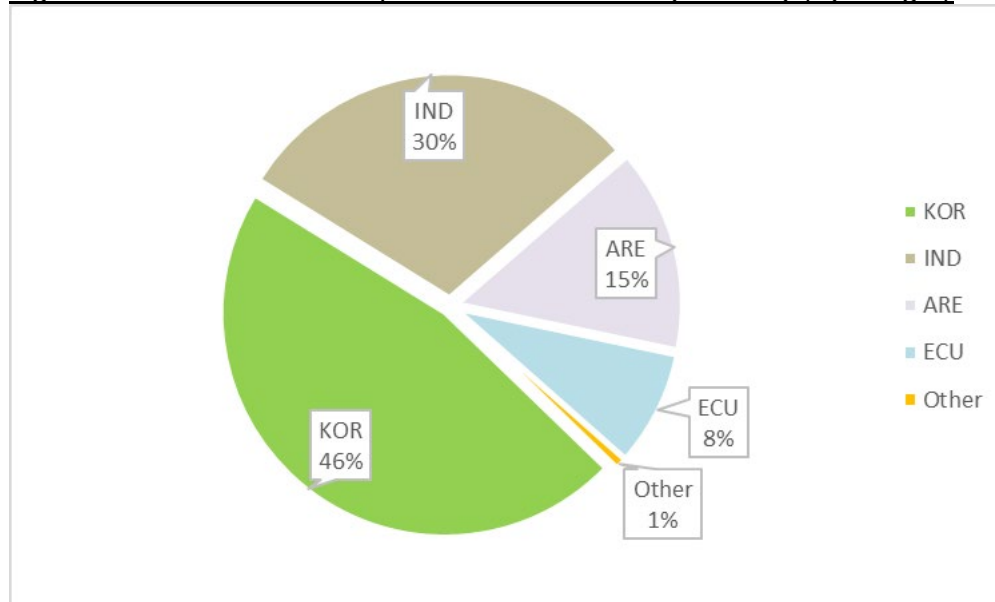
## Batteries

Year	Tons	Percent Change from 2016	Vessel Value (\$)	Percent Change from 2016
2017	30 thousand*	38%	\$34 million**	44%

\*Represents <1 percent of recyclable seaborne exports by weight

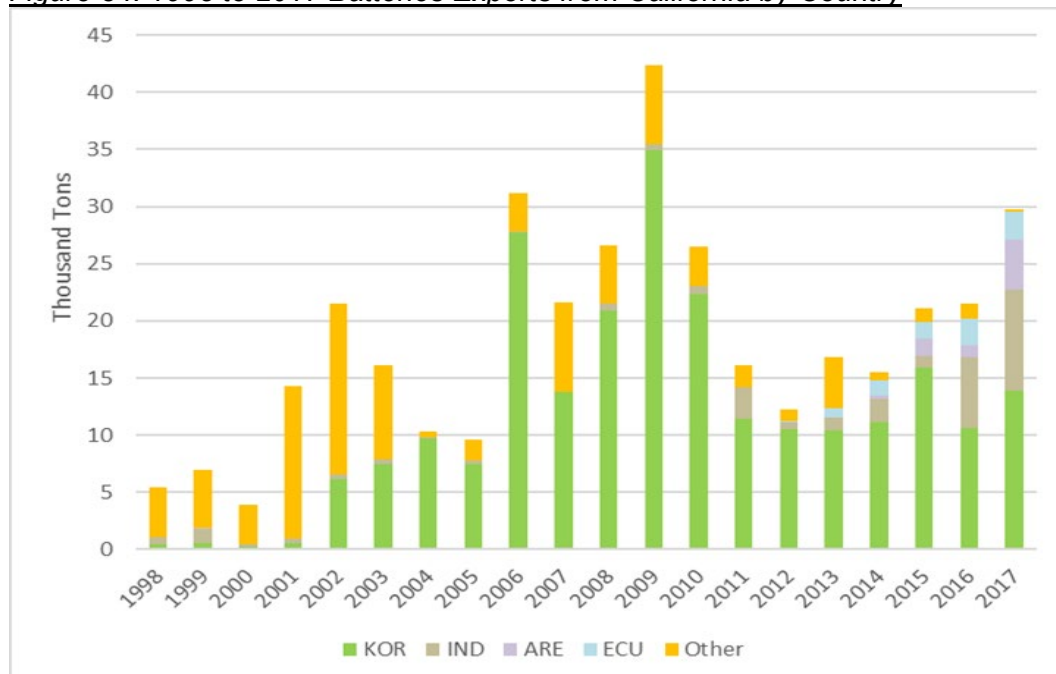
\*\*Represents <1 percent of recyclable seaborne exports by value.

**Figure 33: 2017 Batteries Exports from California by Country (by Weight)**



From WISERTrade<sup>1</sup>

**Figure 34: 1998 to 2017 Batteries Exports from California by Country**



From WISERTrade<sup>1</sup>

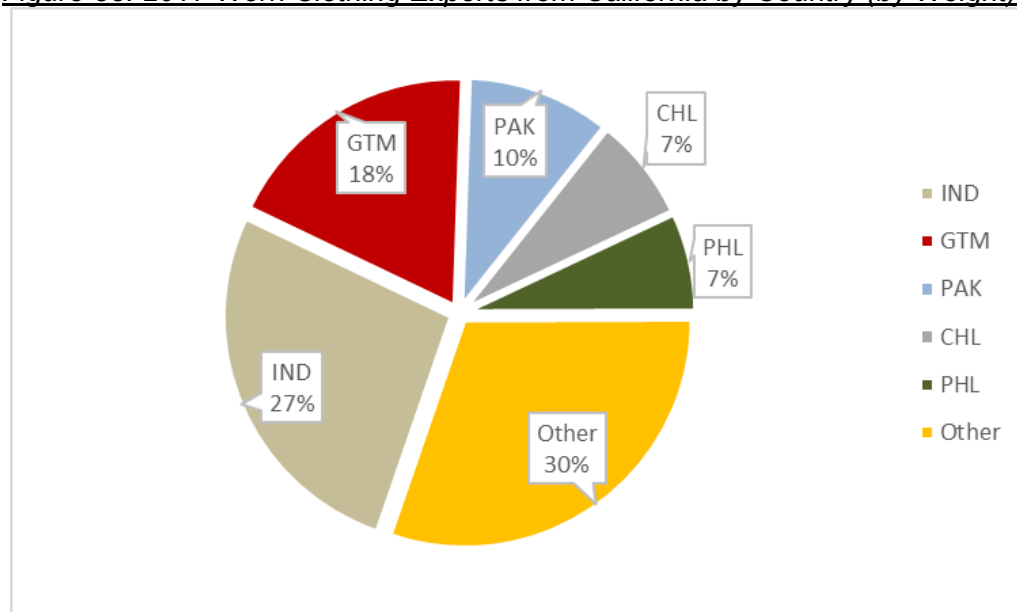
## Worn Clothing

Year	Tons	Percent Change from 2016	Vessel Value (\$)	Percent Change from 2016
2017	137 thousand*	5%	\$99 million**	4%

\*Represents 1 percent of recyclable seaborne exports by weight

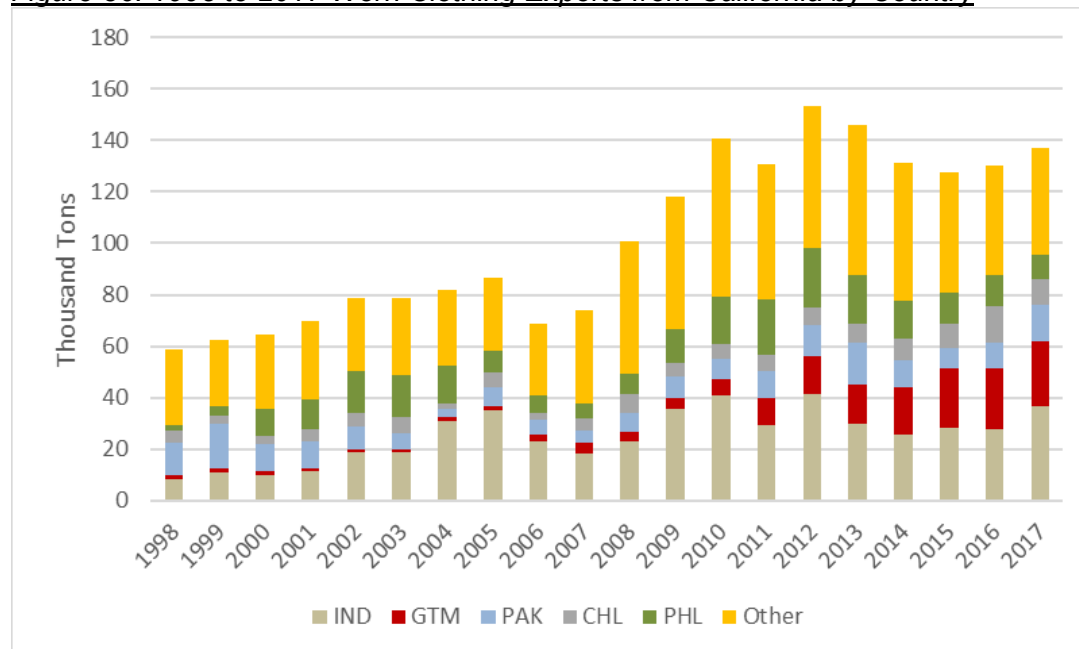
\*\*Represents 2 percent of recyclable seaborne exports by value.

**Figure 35: 2017 Worn Clothing Exports from California by Country (by Weight)**



From WISERTrade<sup>1</sup>

**Figure 36: 1998 to 2017 Worn Clothing Exports from California by Country**



From WISERTrade<sup>1</sup>

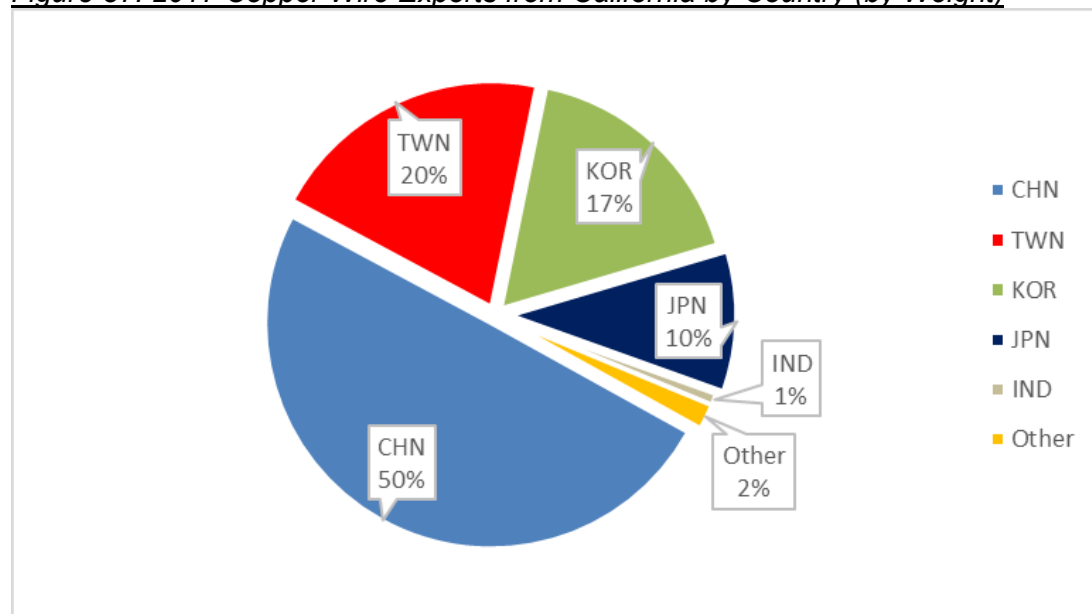
## Copper Wire

Year	Tons	Percent Change from 2016	Vessel Value (\$)	Percent Change from 2016
2017	11 thousand	28%	\$58 million**	40%

\*Represents <1 percent of recyclable seaborne exports by weight

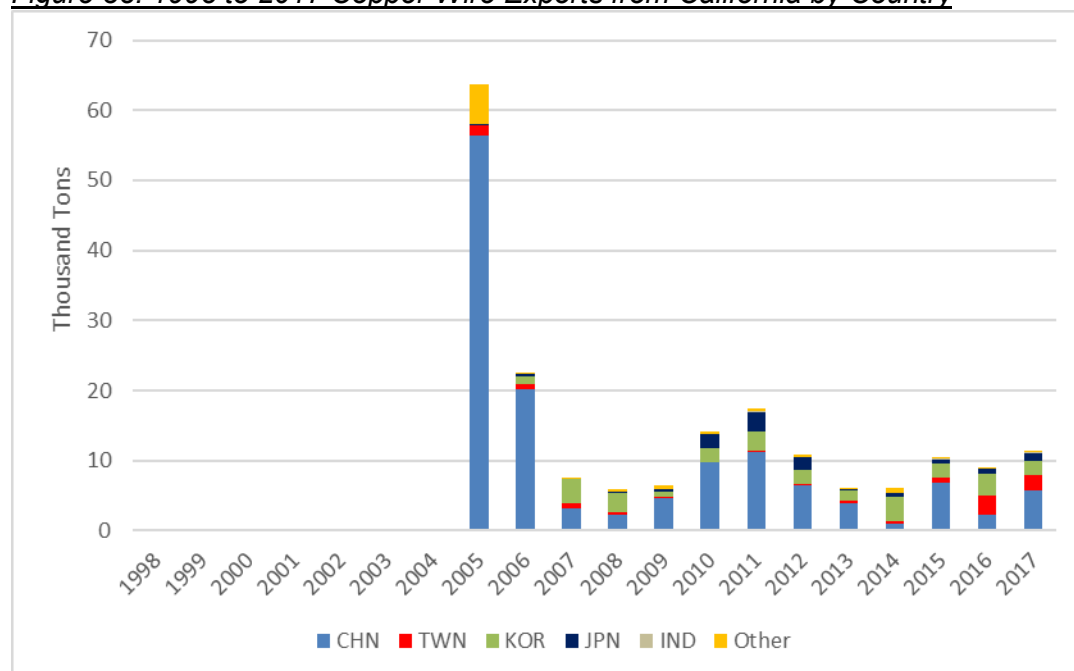
\*\*Represents <1 percent of recyclable seaborne exports by value.

**Figure 37: 2017 Copper Wire Exports from California by Country (by Weight)**



From WISERTrade<sup>1</sup>

**Figure 38: 1998 to 2017 Copper Wire Exports from California by Country**



From WISERTrade<sup>1</sup>

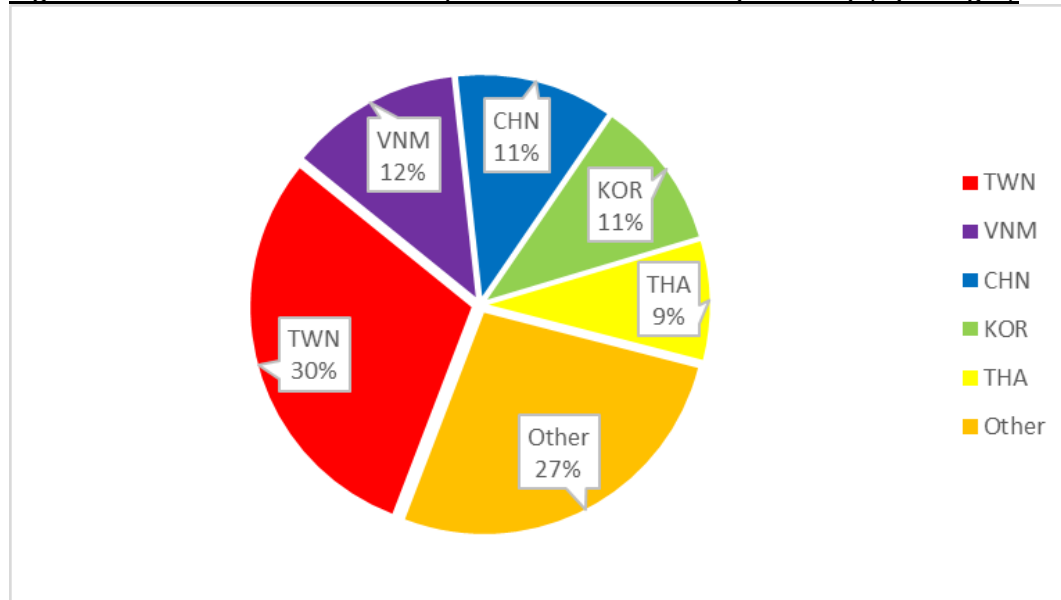
## Ferrous Metals

Year	Tons	Percent Change from 2016	Vessel Value (\$)	Percent Change from 2016
2017	4.6 million*	20%	\$1.5 billion**	39%

\*Represents 32 percent of recyclable seaborne exports by weight

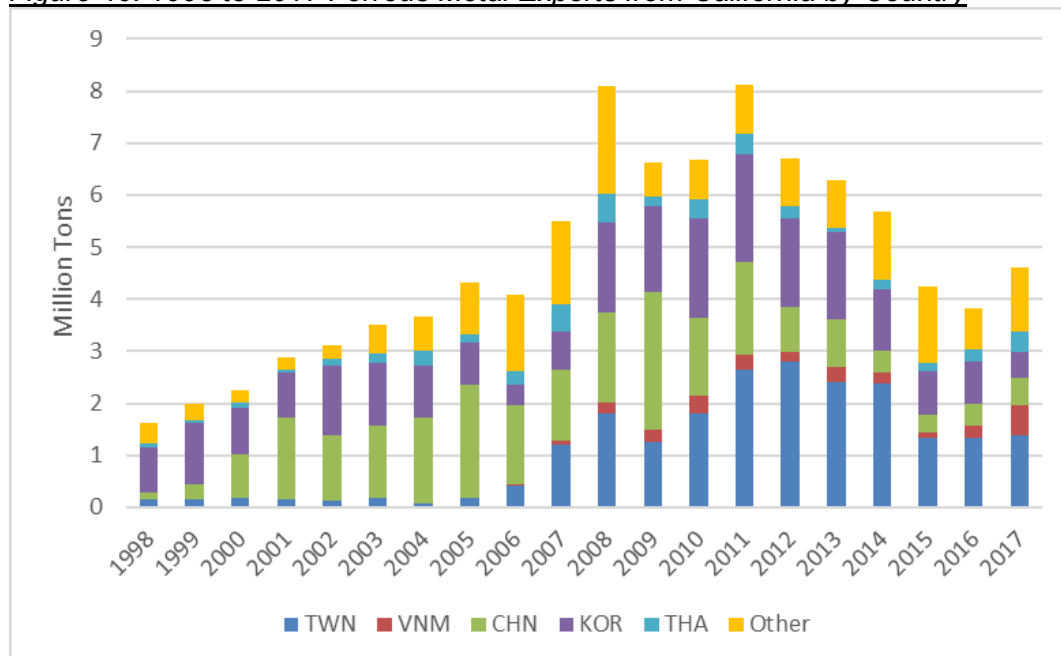
\*\*Represents 29 percent of recyclable seaborne exports by value.

**Figure 39: 2017 Ferrous Metal Exports from California by Country (by Weight)**



From WISERTrade<sup>1</sup>

**Figure 40: 1998 to 2017 Ferrous Metal Exports from California by Country**



From WISERTrade<sup>1</sup>

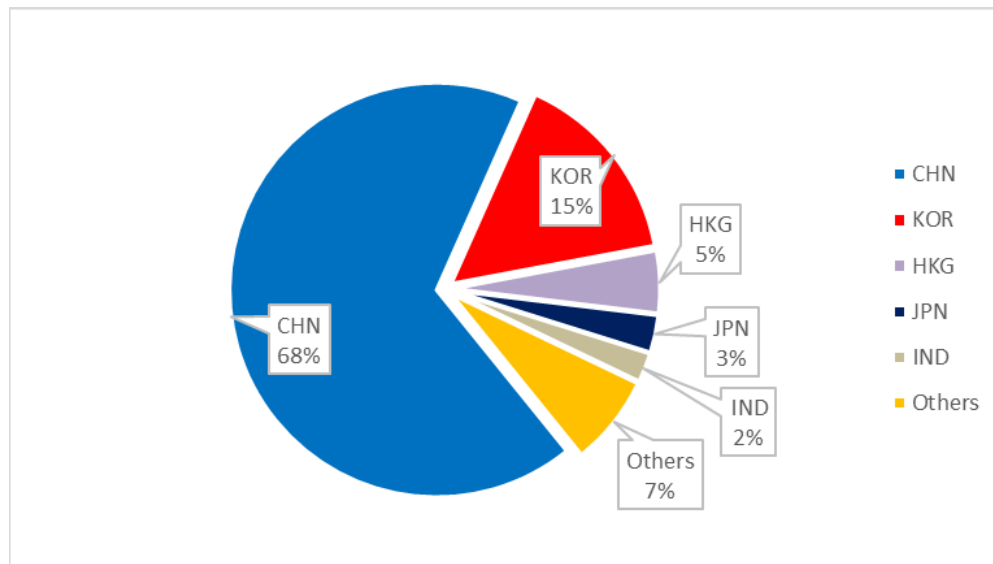
## Non-Ferrous Metals

Year	Tons	Percent Change from 2016	Vessel Value (\$)	Percent Change from 2016
2017	1.1 million*	9%	\$2 billion**	14%

\*Represents 7 percent of recyclable seaborne exports by weight

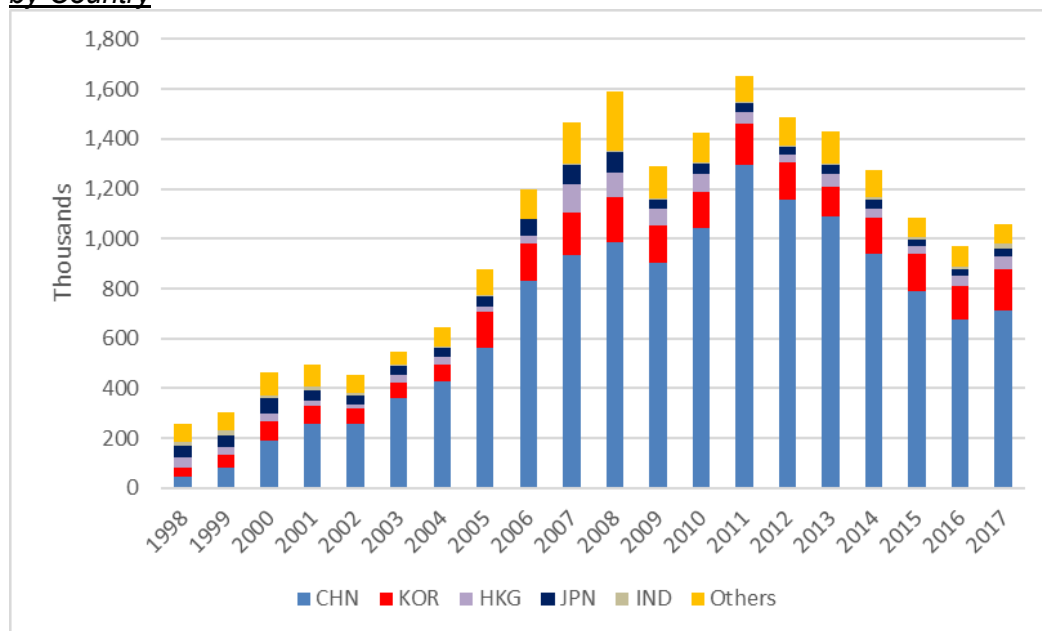
\*\*Represents 39 percent of recyclable seaborne exports by value.

**Figure 41: 2017 Non-Ferrous Metals (Excluding Copper Wire) Exports from California by (by Weight)**



From WISERTrade<sup>1</sup>

**Figure 42: 1998 to 2017 Non-Ferrous Metals (Excluding Copper Wire) Exports from California by Country**



From WISERTrade<sup>1</sup>



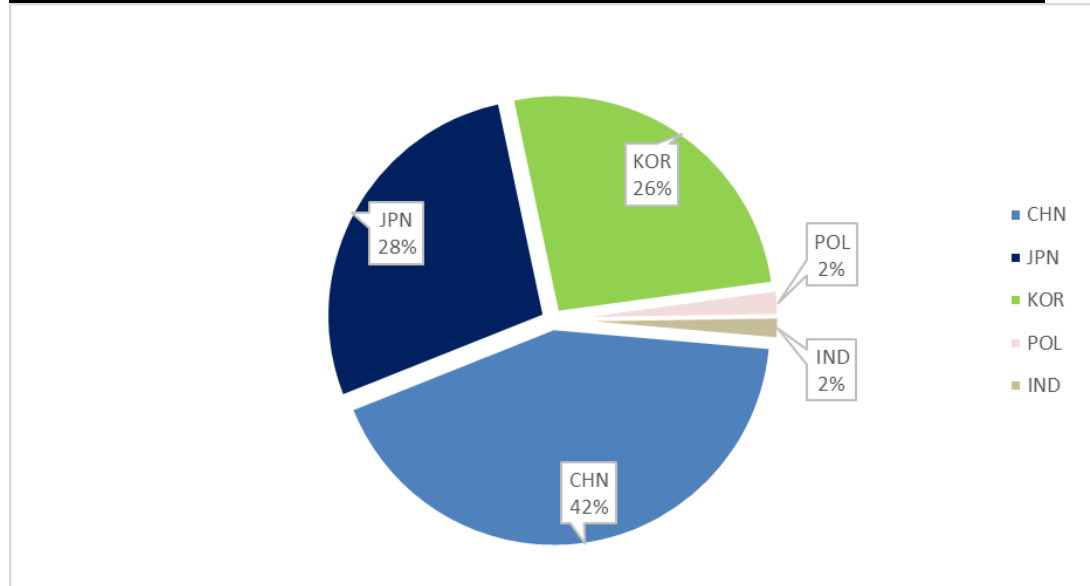
## Aluminum Cans

Year	Tons	Percent Change from 2016	Vessel Value (\$)	Percent Change from 2016
2017	1,149*	-30%	\$1.6 million**	-37%

\*Represents <1 percent of recyclable seaborne exports by weight

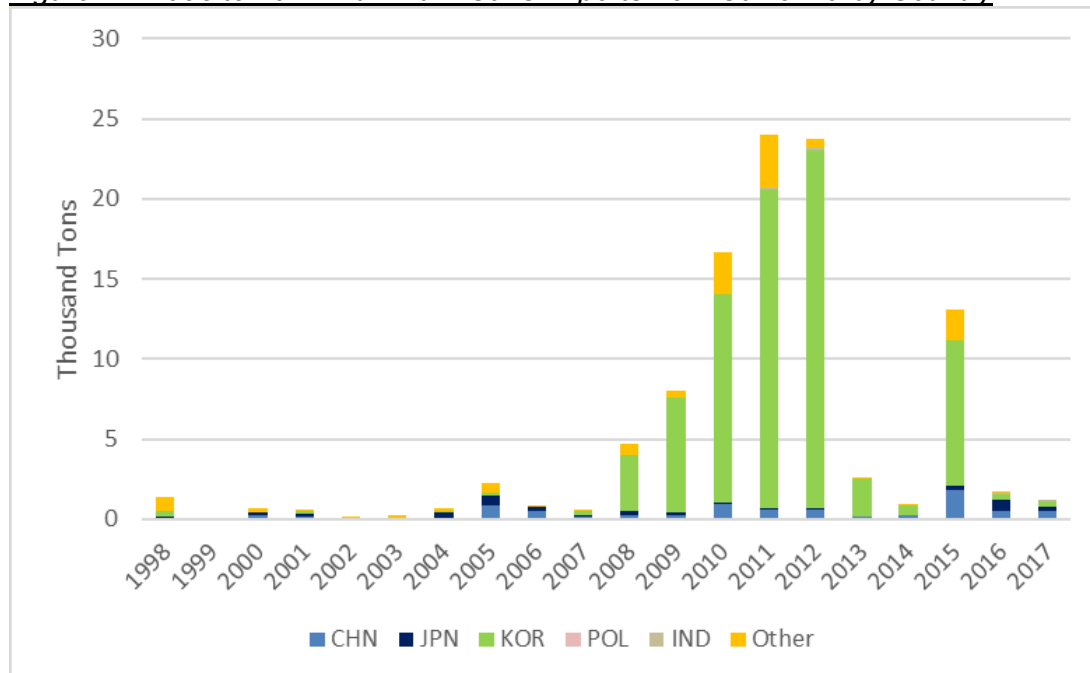
\*\*Represents <1 percent of recyclable seaborne exports by value.

**Figure 43: 2017 Aluminum Cans Exports from California by Country (by Weight)**



From WISERTrade<sup>1</sup>

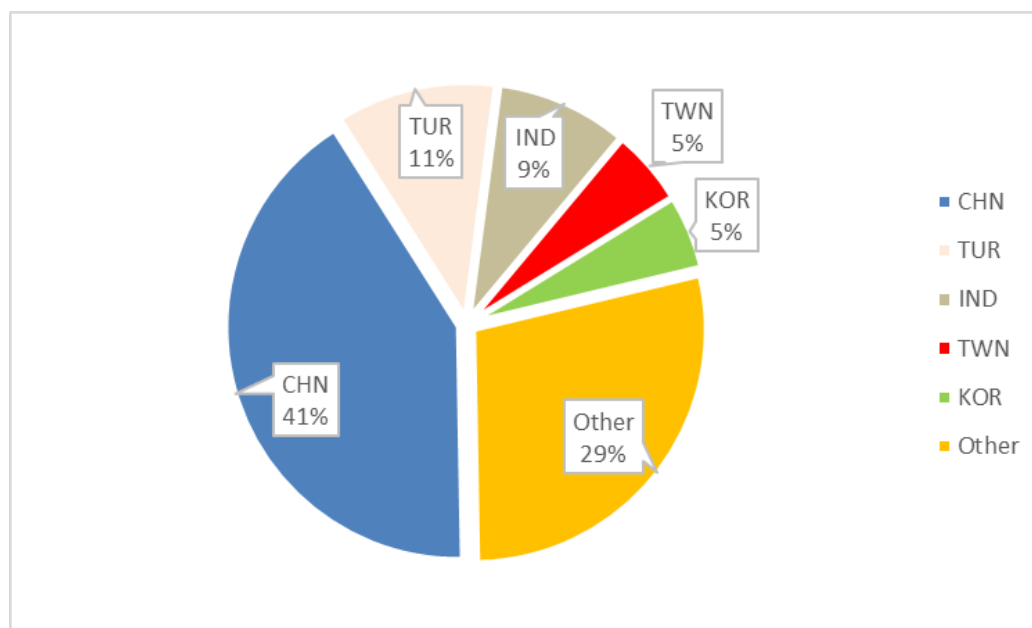
**Figure 44: 1998 to 2017 Aluminum Cans Exports from California by Country**



From WISERTrade<sup>1</sup>

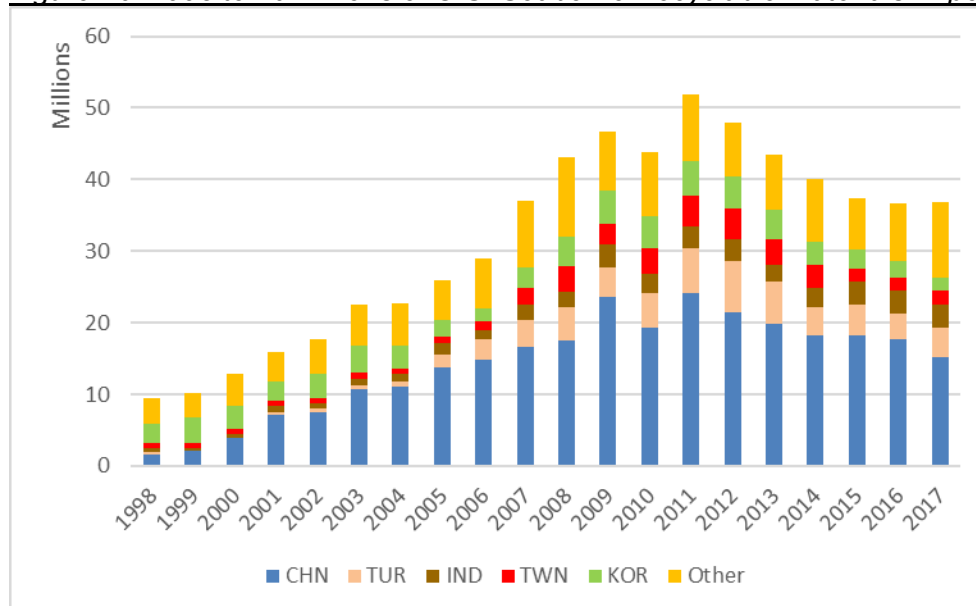
## Appendix 3: 2017 U.S. Seaborne Exports of Recyclable Materials

*Figure 45: 2017 U.S. Seaborne Recyclable Materials Exports by Country (by weight)*



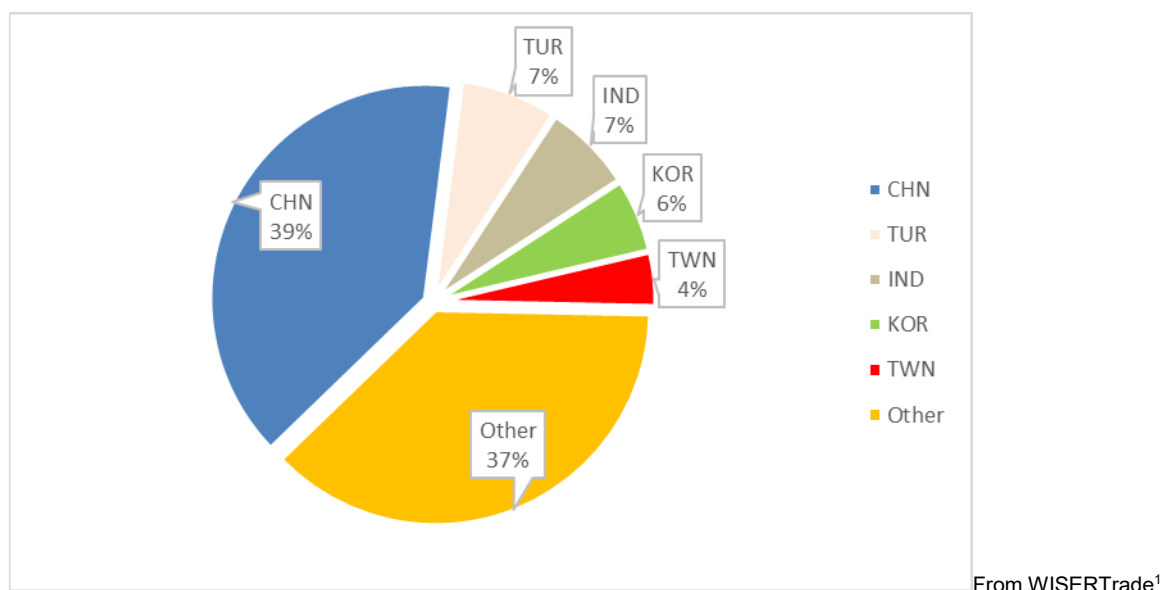
From WISERTrade<sup>1</sup>

*Figure 46: 1998 to 2017 Tons of U.S. Seaborne Recyclable Materials Exports by Country*

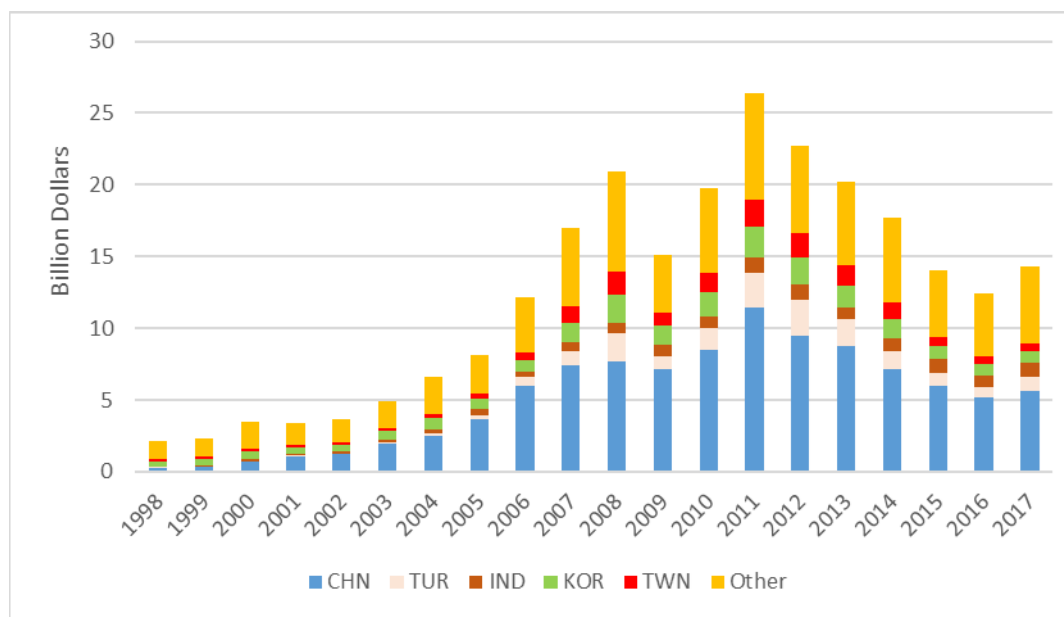


From WISERTrade<sup>1</sup>

**Figure 47: 2017 U.S. Seaborne Recyclable Materials Exports by Country (by Vessel Value)**



**Figure 48: 1998 to 2017 Vessel Value of U.S. Seaborne Recyclable Materials Exports by Country**



## Appendix 4: Country Code Abbreviations

CHN	China	AGO	Angola	TUN	Tunisia
KOR	Korea, Republic Of	AUS	Australia	SRB	Serbia
TWN	Taiwan	GRC	Greece	ISR	Israel
IND	India	BEL	Belgium	NER	Niger
HKG	Hong Kong	ARG	Argentina	CIV	Ivory Coast
TUR	Turkey	MOZ	Mozambique	IRQ	Iraq
THA	Thailand	SLE	Sierra Leone	BGR	Bulgaria
VNM	Vietnam	DOM	Dominican Republic	OMN	Oman
KWT	Kuwait	DEU	Germany	CMR	Cameroon
IDN	Indonesia	COD	Congo, Democratic Republic Of The Congo	MWI	Malawi
PER	Peru	BOL	Bolivia	GAB	Gabon
JPN	Japan	JOR	Jordan	UKR	Ukraine
SAU	Saudi Arabia	COL	Colombia	IOT	British Indian Ocean Terr.
BGD	Bangladesh	SWE	Sweden	DJI	Djibouti
MEX	Mexico	NGA	Nigeria	BRA	Brazil
SLV	El Salvador	TGO	Togo	HUN	Hungary
MYS	Malaysia	ZAF	South Africa	JAM	Jamaica
PAK	Pakistan	UGA	Uganda	GNQ	Equatorial Guinea
ECU	Ecuador	COG	Congo, Republic Of The Congo	GEO	Georgia
GTM	Guatemala	SOM	Somalia	BRN	Brunei
PHL	Philippines	VEN	Venezuela	CHE	Switzerland
CHL	Chile	LAO	Laos	URY	Uruguay
ARE	United Arab Emirates	GIN	Guinea	LTU	Lithuania
TZA	Tanzania	SEN	Senegal	DMA	Dominica
NIC	Nicaragua	LKA	Sri Lanka	FRA	France
HND	Honduras	LUX	Luxembourg	FSM	Federated States Of Micronesia
SGP	Singapore	LBN	Lebanon	GMB	The Gambia
KHM	Cambodia	HTI	Haiti	BIH	Bosnia-Herzegovina
CRI	Costa Rica	ITA	Italy	LCA	St. Lucia
KEN	Kenya	MLI	Mali	MNG	Mongolia
PAN	Panama	NZL	New Zealand	POL	Poland
ESP	Spain	GHA	Ghana	RUS	Russia
BEN	Benin	WSM	Western Samoa	YEM	Republic Of Yemen
NLD	Netherlands	LBR	Liberia	LVA	Latvia
GBR	United Kingdom	ZMB	Zambia		

# References

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<sup>1</sup> **WiserTrade, 2018.** *World Institute for Strategic Economic Research Database*, [www.wisertrade.org](http://www.wisertrade.org)

<sup>2</sup> **World Trade Organization, 2017.** *Notification number 17-3880 G/TBT/N/CHN/1211*, July 18, 2017.  
[https://s3.amazonaws.com/dive\\_static/diveimages/ChinaWTO071817.pdf](https://s3.amazonaws.com/dive_static/diveimages/ChinaWTO071817.pdf)

<sup>3</sup> **Waste 360, 2017.** *China Notifies WTO of Intent to Ban 24 Types of Solid Waste Imports*, David Bodamer, July 19, 2017.  
<https://www.waste360.com/recycling/china-notifies-wto-intent-ban-24-types-solid-waste-imports>

<sup>4</sup> **Institute of Scrap Recycling Industries (ISRI), 2018.** *ISRI's Statement on China's Announcement of Import Ban on Additional Recyclable Materials*, April 19, 2018.  
<http://www.isri.org/news-publications/news-details/2018/04/19/isri%27s-statement-on-china%27s-announcement-of-import-ban-on-additional-recyclable-materials>

<sup>5</sup> **Reuters, 2017.** “China says it won't take any more foreign garbage”, Tom Miles, July 18, 2017.  
<https://www.reuters.com/article/us-china-environment-idUSKBN1A31JI>

<sup>6</sup> **Resource Recycling, Inc., 2017.** *Roundup of the latest developments on China's ban*, Resource Recycling, Inc., September 6, 2017.  
<https://resource-recycling.com/recycling/2017/09/06/roundup-latest-developments-chinas-ban/>

<sup>7</sup> **Resource Recycling, Inc., 2018.** “Import restrictions ripple across Southeast Asia”, Colin Staub, Resource Recycling, Inc., June 6, 2018.  
<https://resource-recycling.com/plastics/2018/06/06/import-restrictions-ripple-across-southeast-asia/>

<sup>8</sup> **Resource Recycling, Inc., 2018** “Markets update: Asian countries further limit plastic imports”, Colin Staub, Resource Recycling, inc., August 22, 2018.  
<https://resource-recycling.com/plastics/2018/08/22/markets-update-asian-countries-further-limit-plastic-imports/>