GREENBLUE / SPC CALIFORNIA REGIONAL FILM & BAG STUDY

FINAL REPORT

Revised - November 15, 2022

RRS recycle.com

Managing change in a resource-constrained world.

ORGANICS MANAGEMENT

WASTE RECOVERY

GLOBAL CORPORATE SUSTAINABILITY

since 1986

CONTEXT FOR PROJECT

- In September 2021, California adopted SB 343 "Truth in Labeling," a regulation prohibiting the use of the chasing arrows symbol on packaging that does not meet recycling access and sortability standards set for California and end market compliance with the Basel Convention.
- This regulation has significant implications for companies using recyclability claims on packaging in California and has made compliance with recyclability claims more complex.
- CalRecycle will be establishing the substantiation for recyclables that flow through the curbside system.
- LDPE film and flexible packaging is managed outside the curbside system in California and may require independent substantiation. From interviews with some retailers, RRS did learn that CalRecycle appears to also be asking for data from retailers on PE film and bag reclamation.

PROJECT OBJECTIVES

- Document consumer access to recycling for LDPE film and flexible packaging within California.
  - Store drop off
  - Municipal drop off
  - MRF film collection
- Document the LDPE film and flexible recycling value chain and specifically:
  - Film quantity
  - Film quality
  - EOL solutions that meet California requirements
- Determine the volumes of LDPE film/flexibles collected and reclaimed.
- Map collection and MRF infrastructure for LDPE films.

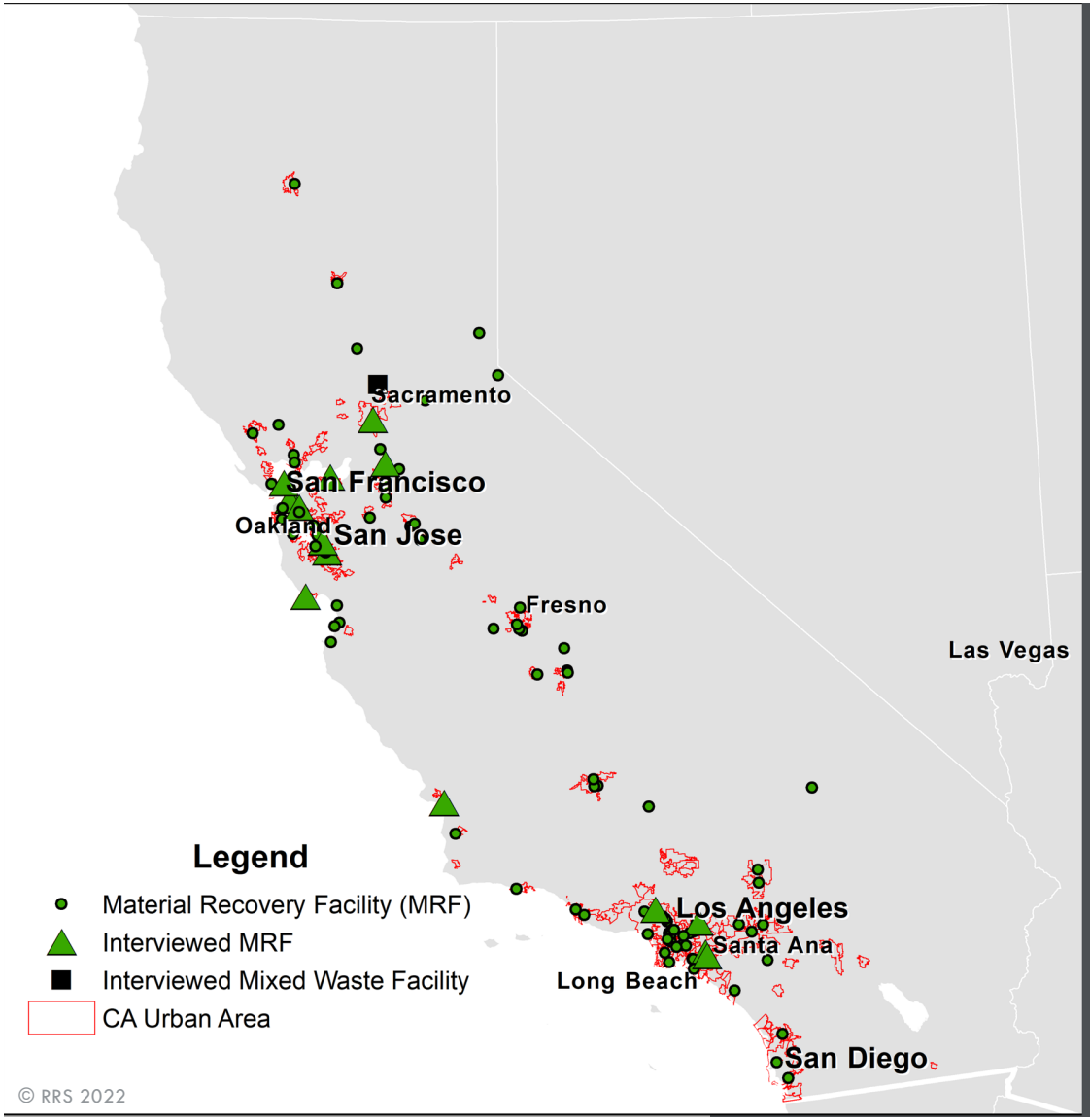
PE FILMS AND BAG CAPTURE AT THE MRF

TASK 1: PE FILM CAPTURE AT THE MRF - APPROACH

- Map MRFs in CA and, for those interviewed, captured the following information:
  - Type of MRF
  - Annual tonnage processed
  - Whether they accept and/or capture LDPE film based on public data
  - Film quantity marketed per year
  - Film quantity disposed of in residual tonnage per year
- Focus outreach on largest MRFs and MRFs that were believed to be most likely collecting film

TASK 1: PE FILM CAPTURE AT THE MRF - RESULTS

- Only one of the MRFs interviewed formally accepts PE film.
  - All receive PE film and bags as part of inbound stream.
  - Some separate films, others do not.
  - None market film. All send to landfill.
  - One third of facilities have experienced a decrease in bags received, with one facility reporting a 10-20% reduction. Two thirds reported no decrease.
- Inbound film ranges between 0.7% and 4.2% (most commonly <1%–2%) for most MRFs.
- One mixed waste facility that accepts film has a higher quantity of inbound film: 4.8% film (1.3% clean, 3.5% dirty).
- The SOP for one large MRF operator is not to open bags due to safety concerns. Therefore, any bagged bags are disposed.
- The study confirmed MRF's are not a viable pathway for film recycling in CA today.



TASK 1: PE FILM CAPTURE AT THE MRF

- CA MRFs are shown on the map as green points.
- Interviewed MRFs (green triangles) are relatively well-distributed geographically.
- MRF density correlates to population density (and location of urban areas).

The 15 MRFs (combined) capture approximately 35,000 tons (70MM lbs) of PE film and bags and 100% of this is disposed

RRS estimates that the CA MRF fleet captures roughly 130,000 tons (260MM lbs) of PE film and bags and most is disposed.*

*RRS is using simple scaling to obtain total for CA MRF fleet.

RETAIL STORE DROP OFF AND CONSUMER ACCESS

TASK 2 – RETAIL FILM DROP OFF CHARACTERIZATION AND QUANTITY ESTIMATE

APPROACH

- RRS will document the flow and character of films collected and reclaimed from California. Outcomes will include the following:
  - Consumer access to LDPE film and packaging collection at store drop off, municipal drop off, and private services.
  - Identify gaps in drop off network.
  - Description of how PE film collection occurs and how it is managed and reclaimed.
  - Comment on film quality and impacts on value and pre-processing requirements.
  - Determine the volume of PE films and bags collected through retail drop off and other collection programs in CA.

Retailers that were interviewed or emailed include:

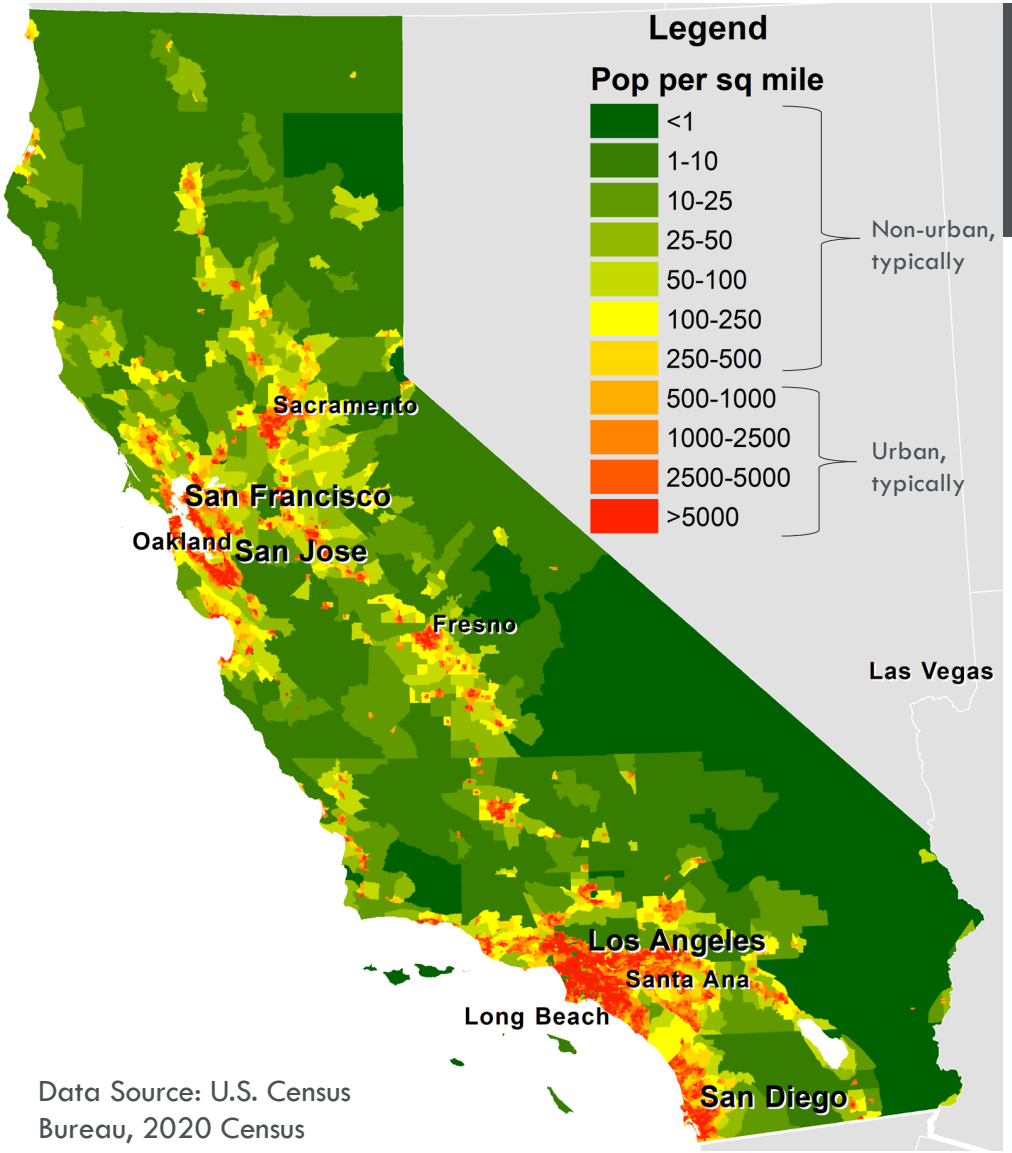
- Albertsons and brands
- Target
- Kohl's
- Walmart Stores
- Home Depot
- Lowe's

TASK 2 – RETAIL FILM DROP OFF CHARACTERIZATION AND QUANTITY ESTIMATE

METHODOLOGY

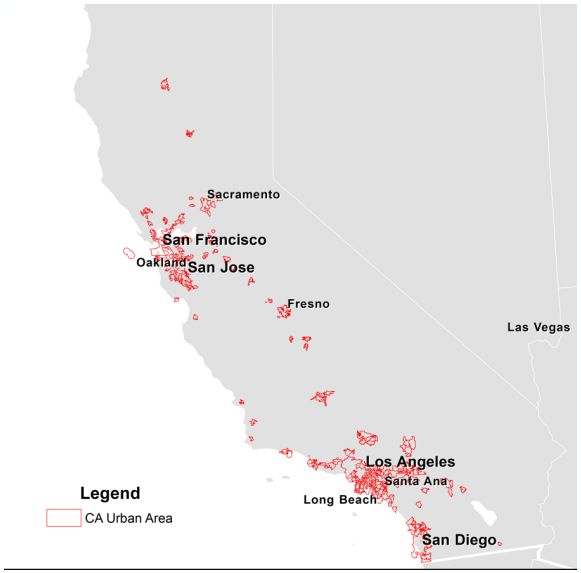
- RRS used its retailer network, the SPC retailer network, as well as RILA to identify a list of retailers with store drop off to contact for the study.
- RRS also reviewed BagandFilmRecycling.org and was able to download data for CA.
- Websites for more than 24 retailers were reviewed.
- RRS reached out to more than 14 retailers.
- A major grocery retailer noted that 100% of their stores will be offering store drop of by the end of 2022.
- Home Depot and Lowe's were confirmed by calling several retail locations, but RRS was not able to connect with a corporate representative. RRS used their corporate reports along with limited calls to CA stores.
- Volume data was collected under NDA. Volumes are reported as a roll up to preserve confidentiality.

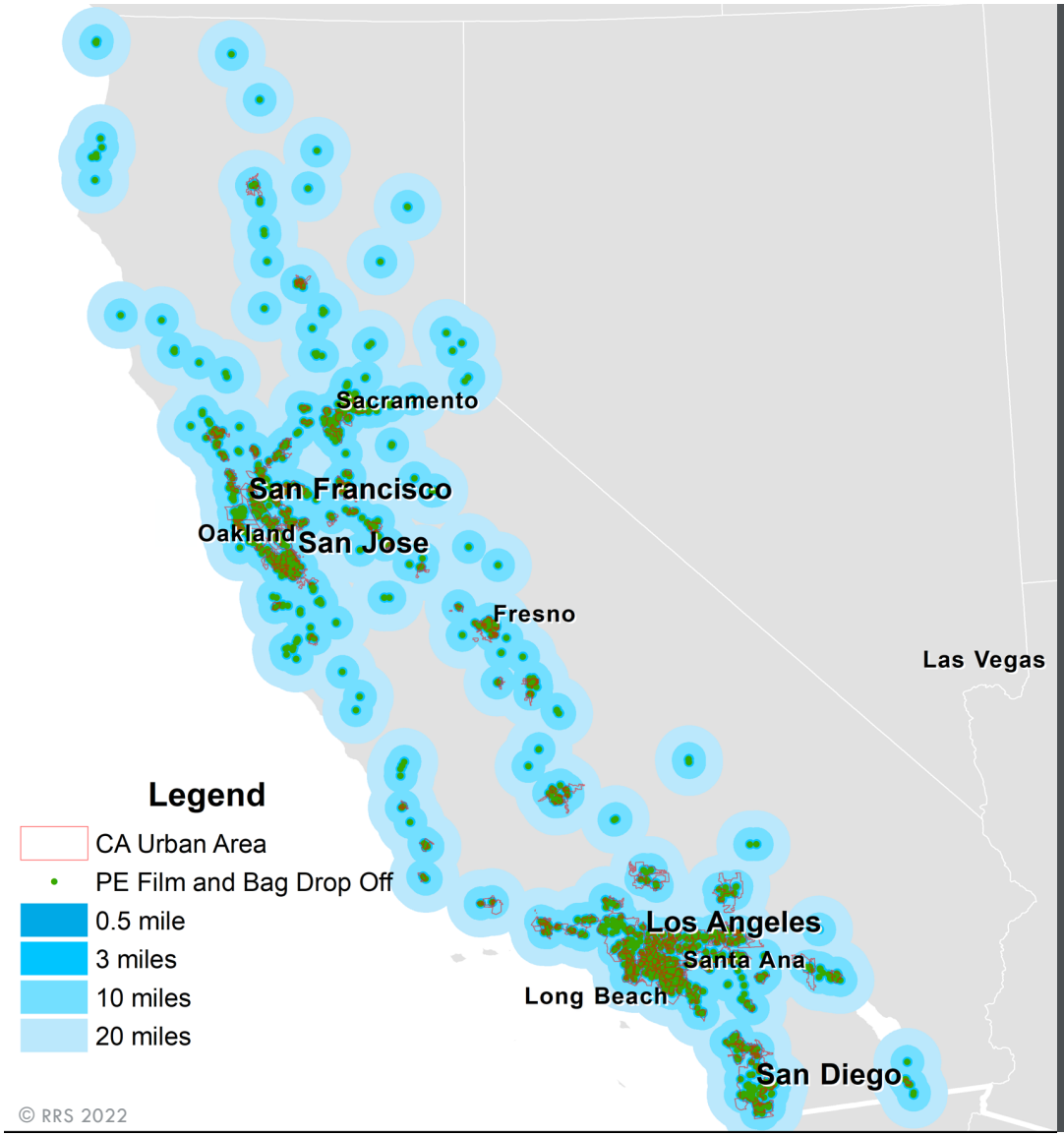
FOR REFERENCE: CA POPULATION DENSITY



Data Source: U.S. Census Bureau, 2020 Census

- As of March 2022, the U.S. Census Bureau defines an area as urban if it contains at least 2,000 housing units or has a population of at least 5,000 (87 FR 16706).
- The Census Bureau does not define "rural." All geographic areas that are not classified as urban are referred to as "non-urban."
- RRS uses these designations to calculate access to store drop off using population. The following slides address access based on radial distance, drive distance, and drive time.





TASK 2: RETAIL DROP OFF AND CONVENIENT ACCESS

RADIAL DISTANCE

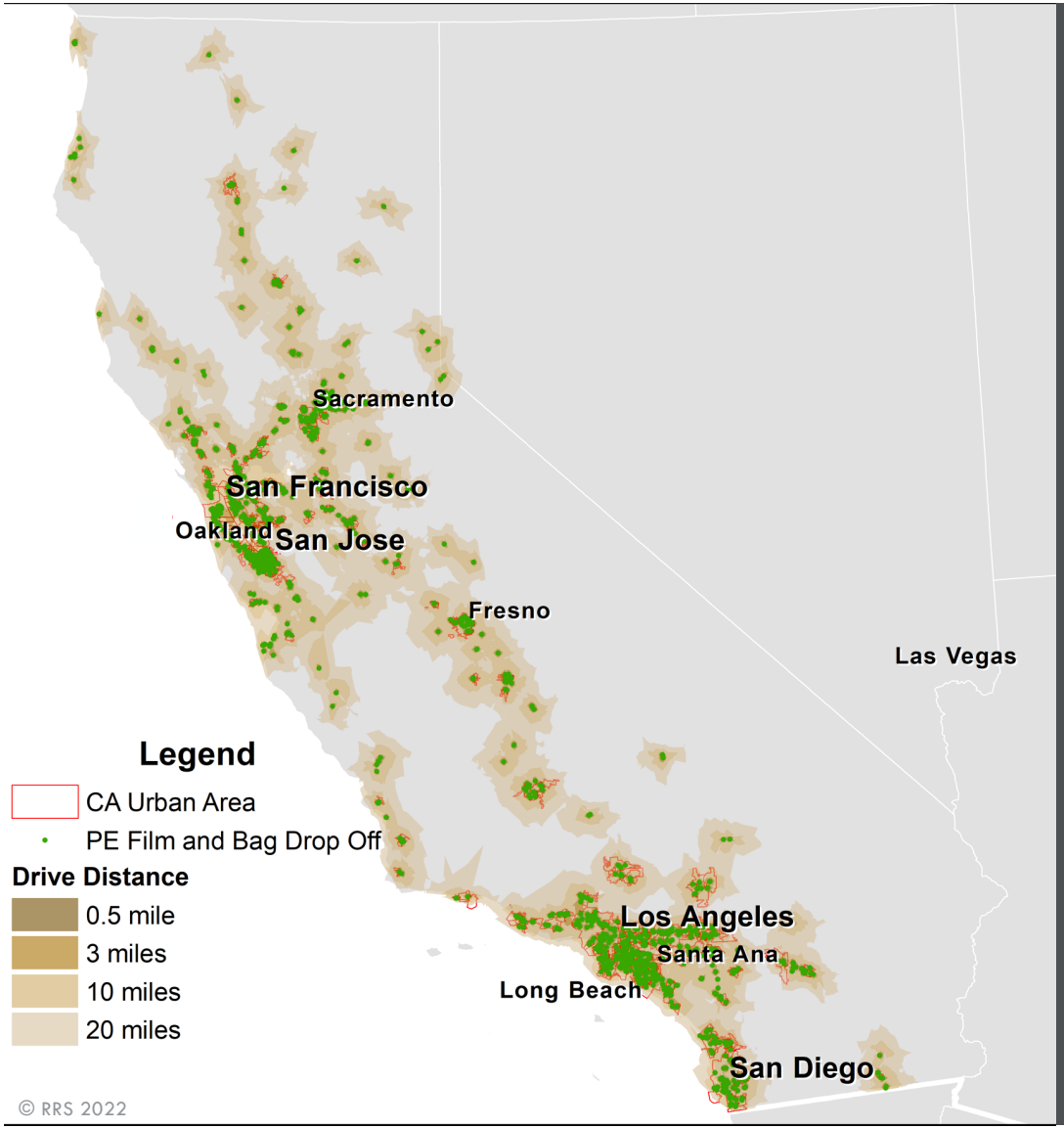
- Heat map shows **radial distance** to the nearest PE film and bag retail drop off location.
- Radial distance assumes that consumers move to a retail drop off location in a straight line.
- Most of the retail drop off locations are clustered in large urban areas.
- Access to store drop off using straight population is 87.6%.

ACCESS CALCULATED USING RADIAL DISTANCE

STRAIGHT POPULATION

Circular Radius Distance	Urban Only Population Access (%)	Non-Urban Only Population Access (%)	Statewide CA Population Access (%)
0.5 mile	15.8%	8.3%	13.4%
0.5-3 miles	80.5%	60.9%	74.2%
3-10 miles	3.7%	21.8%	9.5%
10-20 miles	0.0%	6.2%	2.0%
20+ miles	0.0%	2.8%	0.9%

- Access to store drop off ≤3 miles using straight population is 87.6%



TASK 2: RETAIL DROP OFF AND CONVENIENT ACCESS

DRIVING DISTANCE

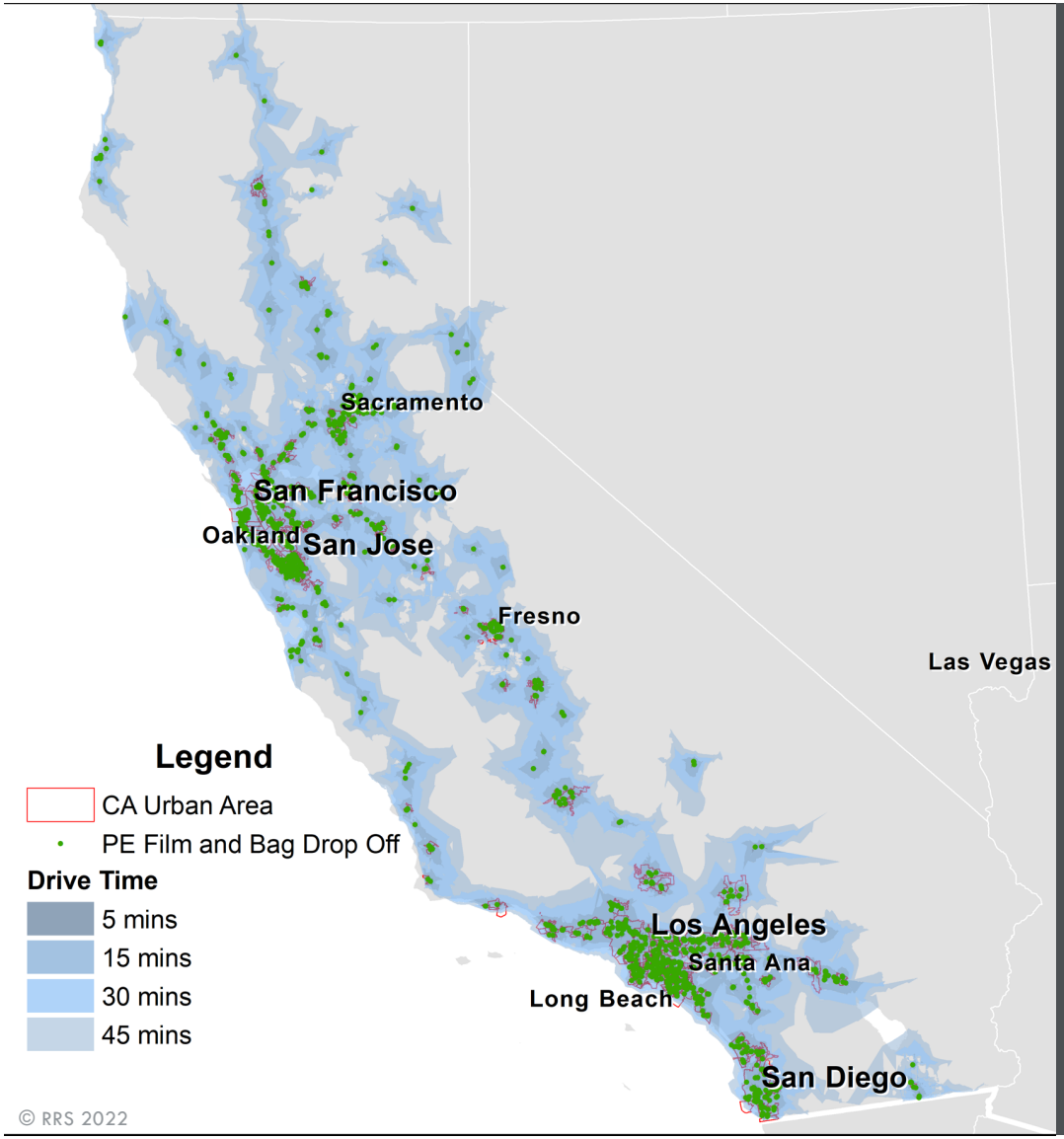
- Heat map shows **driving distance** to the nearest PE film and bag retail drop off location.
- Driving distance assumes consumers use the road network to travel to a retail drop off location.
- Most of the retail drop off locations are clustered in large urban areas.
- Access to store drop off ≤3 miles using straight population is 78.1%.

ACCESS CALCULATED USING DRIVING DISTANCE
STRAIGHT POPULATION

Driving Distance	Urban Only Population Access (%)	Non-Urban Only Population Access (%)	CA Population Access (%)
0.5 mile	5.4%	2.4%	4.4%
0.5-3 miles	82.5%	55.0%	73.7%
3-10 miles	11.9%	27.1%	16.8%
10-20 miles	0.2%	10.4%	3.5%
20+ miles	0.0%	5.1%	1.6%

- Access to store drop off ≤3 miles using straight population is 78.1%

*Results weighted by urban only population and non-urban only population.



TASK 2: RETAIL DROP OFF AND CONVENIENT ACCESS

DRIVING TIME

- Heat map shows **driving time** to the nearest PE film and bag retail drop off location.
- Driving time is calculated using speed limits, traffic controls, and road network distances.
- 64.1% of California consumers have access to store drop off within a 5 minute drive (≤5 minutes from home).
- 92.9% of California consumers have access to store drop off within a 15 minute drive (≤15 minutes from home).
- The consumer average (mean) drive time is 6.2 minutes.
- The consumer median drive time is 9.0 minutes.

ACCESS CALCULATED USING DRIVING TIME

Drive Time	CA Population Access (%)
0-5 min	64.1%
5-15 min	28.8%
15-30 min	4.5%
30-45 min	1.4%
45+ min	1.2%

- 64.1% of California consumers have access to store drop off within a 5-minute drive (≤5 minutes from home).
- 92.9% of California consumers have access to store drop off within a 15-minute drive (≤15 minutes from home).

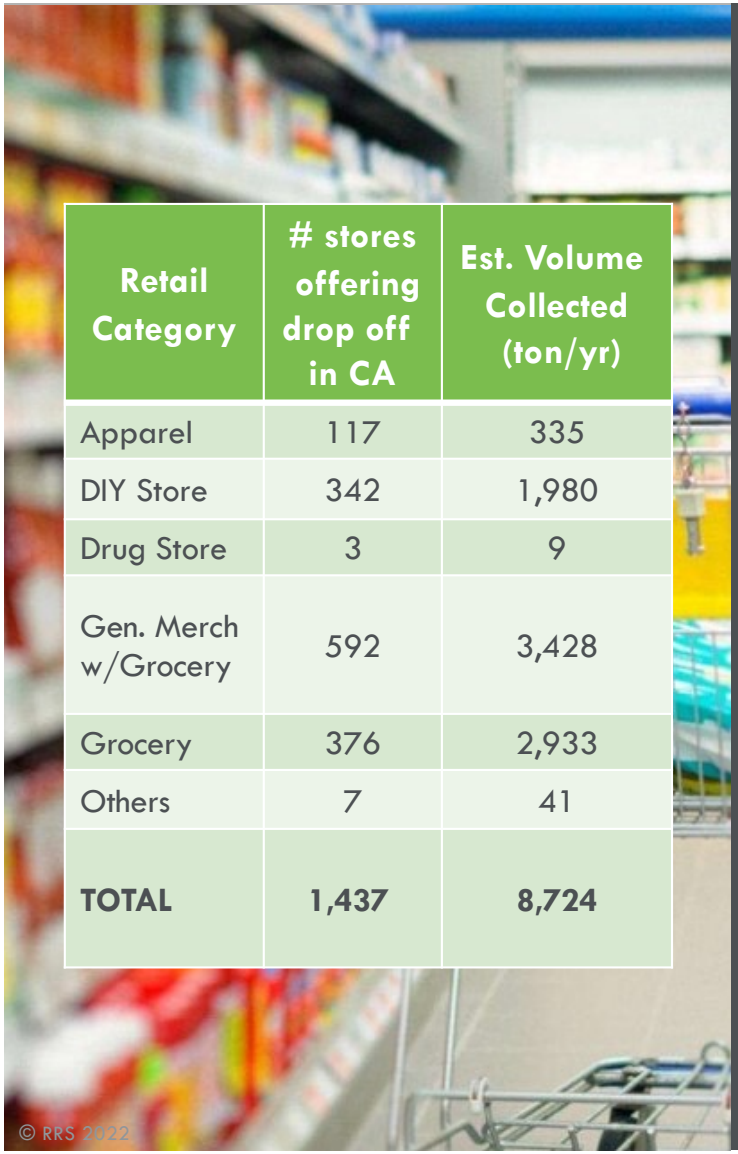
Avg. California Consumer Access	Drive Time (minutes)
Mean	6.2
Median	9.0

- The consumer mean drive time is 6.2 minutes.
- The consumer median drive time is 9.0 minutes.
- The average drive time for any consumer (across the state) to the nearest drop off location was calculated using census blocks, the smallest geographic area for which the US Census Bureau collects and tabulates census data.

TASK 2 – RETAIL FILM DROP-OFF CHARACTERIZATION AND QUANTITY ESTIMATES

RESULTS

- Universally, retail drop off films and bags are co-mingled with back of house films and then transported back to DCs for baling and preparation for market.
- At least one major retailer separates mixed colored material and clear material before baling.
- No retailer specifically tracks the amount of store drop off material collected. All volumes reported represent a combination of drop off and back of house films.
- Volumes are reported at the DC level, not the store level.
- Can only estimate of post-consumer film collection volumes through store-level audits.



Retail Category	# stores offering drop off in CA	Est. Volume Collected (ton/yr)
Apparel	117	335
DIY Store	342	1,980
Drug Store	3	9
Gen. Merch w/Grocery	592	3,428
Grocery	376	2,933
Others	7	41
TOTAL	**1,437**	**8,724**

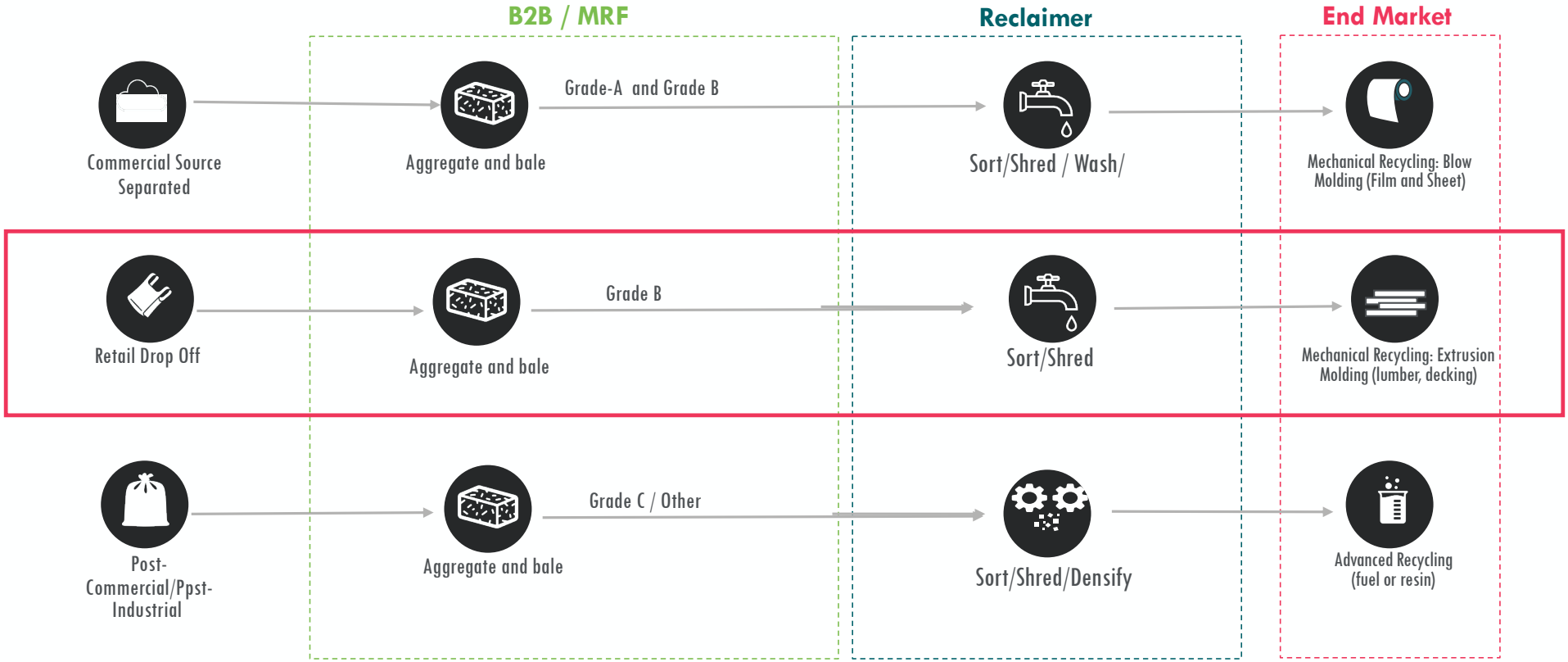
TASK 2 – RETAIL FILM DROP OFF CHARACTERIZATION AND QUANTITY ESTIMATES

RESULTS

- Average grocery store collects 15,600 lbs (or 7.8 tons) of film per year
- Average grocery-big box store collects 11,600 lbs (or 5.8 tons) of film per year
- RRS estimates that about 17.45 MM lbs (8,724 tons) of PE film and bags are collected through store drop off in CA.
- Estimated volumes use both retailer specific data and modeled per store generated data when specific values were not shared by retailers.
- It is not possible to determine the amount of post-consumer bags and films that are represented within these totals.

LDPE FILM RECLAMATION AND CA END MARKETS

TYPICAL FILM FLOWS FROM GENERATOR TO END MARKET



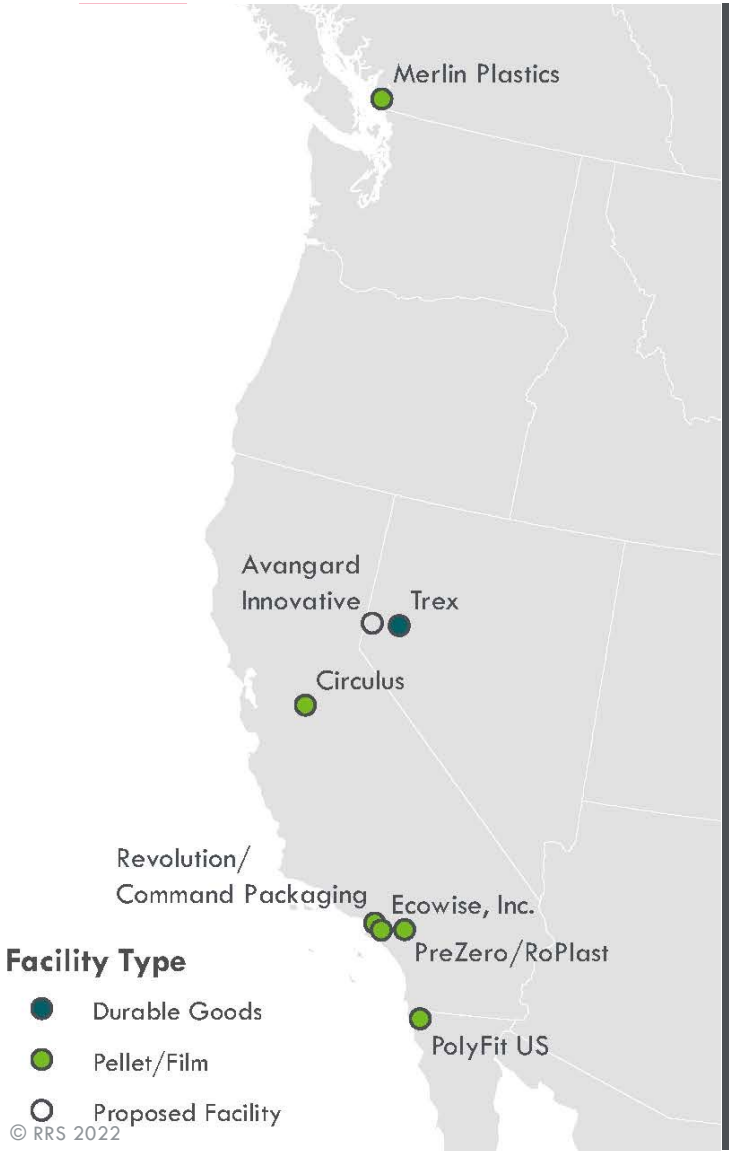
*Note: Plastic separation may or may not happen at the MRF. Films are not being processed/sorted within the MRF.

PE FILM **GRADES AND MARKETS**

- Grade A – clear PE film
  - PCR content commitments and content mandates have translated into strong demand for LPDE PCR.
  - Procuring direct from DCs, other commercial outlets or brokers
  - Bale quality can range from A to A/B.
  - Mechanical reclaimers produce grade A and grade B pellets.

- Grade B – retail / colored PE film
  - Material is mixed colored but may also be a mix of retail store consumer drop off and back of house retail film.
  - Procurement from large generators is often direct to end markets. "Less than truckload" generators are using brokers or commercial MRFs.
  - Grade B pellets are also used in films.

*Note: APR and ISRI updated film bales specifications and they are now reclassified



PE FILM END MARKETS THAT SERVE CALIFORNIA

- There are 4 PE bag and film reclaimers within California, 2 just outside California and another in British Columbia.
- In total, they represent more than 500 MM lbs of reclamation capacity; a bit over half is represented by Trex.
- Trex is the largest regional end market processing primarily Grade B bales and produce decking and lumber.
- Mechanical PE film reclaimers typically prefer Grade A bales and produce grade A or B LDPE pellet
- All film to pellet/film reclaimers for PE films and bag have wash lines.

Of the 17.45 MM lbs of PE films and bags collected in CA, RRS estimates that 14.8 and 15.7 MM lbs are reclaimed. Depending on the end market, the recovery rate is assumed to range between 85% and 90%.

SUMMARY OF RESULTS

- Consumer access to store drop off for PE films and bags is estimated to be the following:

Type of Access Metric	Statewide CA Population Access (%)
Radial distance access	87.6% within 3 miles
Drive distance access	78.1% within 3 miles
Drive time access	64.1% within 5 minutes

- Consumer access to store drop off in rural areas is more limited.
- Total volume of PE films and bags collected in CA for recycling (estimate): 17.45 MM lbs yr.
- Volume of CA film reclaimed is estimated between 85%-90%.
- Principal end market for store drop off films is Trex.
- Substantial growth in PE film reclamation capacity in CA. Most is focused on Grade A films.
- Success of retail store drop off for bags and films is based on consumer convenience (part of grocery shopping routine) and retailers are providing backhaul and aggregation services along with positive economics compared to landfill.

RRS recycle.com

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