

EP 704-1 Commodity Exemptions

TECHNICAL CONFERENCE

Background

Original Recommendations

- 14-2: Crushed Stone or Rip Rap
- 29-914: Coke Produced from Coal
- 32-4: Cement
- 33-12: Iron and Steel
- 40-211: Iron and Steel, Scrap

Hydraulic Cement vs Ready-Mix Cement

			Initial Screens		Indicators							
Commodity		Overall Dashboard	2018 % of Cars	2018 %	All Traffic	All Traffic	Comp Inf	Comp Inf	Length of Haul	Length of Haul	Comp RVC	Comp RVC
STCC5	STCC Name	Signal	RVC 180	Intermodal	Recent RVC	RVC Change	Recent	Change	Recent	Change	Recent Diff	Diff Change
32411	Hydraulic Cement, Natural, Portland or	Moderate	52.2%	0.4%	Strong	Strong	Weak	Moderate	Moderate	Strong	Moderate	Moderate
32412	Ready-mix Cement or Concrete, Dry	Weak	Indeterminate	100.0%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

- Ready-Mix Cement moved entirely as intermodal traffic in 2018.
- Hydraulic Cement had < 1% of its traffic moving as intermodal traffic in 2018.

Differences Among Rip Rap Commodities

			Initial Screens		Indicators							
Commodity		Overall Dashboard	2018 % of Cars	2018 %	All Traffic	All Traffic	Comp Inf	Comp Inf	Length of Haul	Length of Haul	Comp RVC	Comp RVC
STCC5	STCC Name	Signal	RVC 180	Intermodal	Recent RVC	RVC Change	Recent	Change	Recent	Change	Recent Diff	Diff Change
14211	Agricultural Limestone, Broken or Crushed	Weak	50.7%	1.2%	Moderate	Strong	Weak	Weak	Weak	Weak	Indeterminate	Indeterminate
14212	Fluxing Limestone or Stone, Broken or	Weak	100.0%	0.0%	Strong	Strong	Weak	Weak	Weak	Weak	Indeterminate	Indeterminate
14213	Dolomite, Broken or Crushed	Weak	37.1%	0.0%	Moderate	Weak	Weak	Weak	Weak	Weak	Strong	Indeterminate
14219	Broken or Crushed Stone or Riprap, Nec	Moderate	59.7%	0.1%	Strong	Strong	Weak	Weak	Weak	Moderate	Strong	Strong

- At the STCC 5 level, Broken or Crushed Stone or Riprap, Nec looks different.
- Other Rip Rap commodities all send weak signals.

48 Commodities Evaluated in New Approach

Consider Exemption Revocation

Crushed Stone or Rip Rap	14211	Agricultural Limestone, Broken or Crushed
	14212	Fluxing Limestone or Stone, Broken or Crushed
	14213	Dolomite, Broken or Crushed
	14219	Broken or Crushed Stone or Riprap, Nec
Coke Produced from Coal	29914	Coke Produced from Coal
Cement	32411	Hydraulic Cement, Natural, Portland or Masonry
	32412	Ready-Mix Cement or Concrete, Dry
Iron and Steel	33121	Steel Ingot or Semi Finished Shapes
	33122	Iron or Steel Plates
	33123	Iron or Steel Sheet or Strip
	33124	Iron or Steel Bars, Bar Shapes or Rods
	33125	Structural Shapes or Piling Products
	33126	Iron or Steel Pipe, Tubes or Fittings
	33127	Tin Mill Products
	33128	Railway Track Material
	33129	Primary Iron or Steel Products, Nec
Iron and Steel Scrap	40211	Iron or Steel Scrap, Wastes or Tailings
Requested by Parties	24114	Pulpwood Logs
	24115	Pulpwood or Other Wood Chips
	24211	Lumber, Rough or Dressed
	24321	Plywood or Veneer or Built-up Wood
	24991	Strand Board Wood Products
	24996	Wood Particle Board
	26217	Special Industrial Paper
	26311	Fibreboard, Paperboard or Pulpboard
	37111	Motor Passenger Cars, Assembled
	37112	Motor Trucks or Truck Tractors, Assembled
	37143	Motor Vehicle Frames
	40241	Paper Waste or Scrap

Consider Additional Exemption

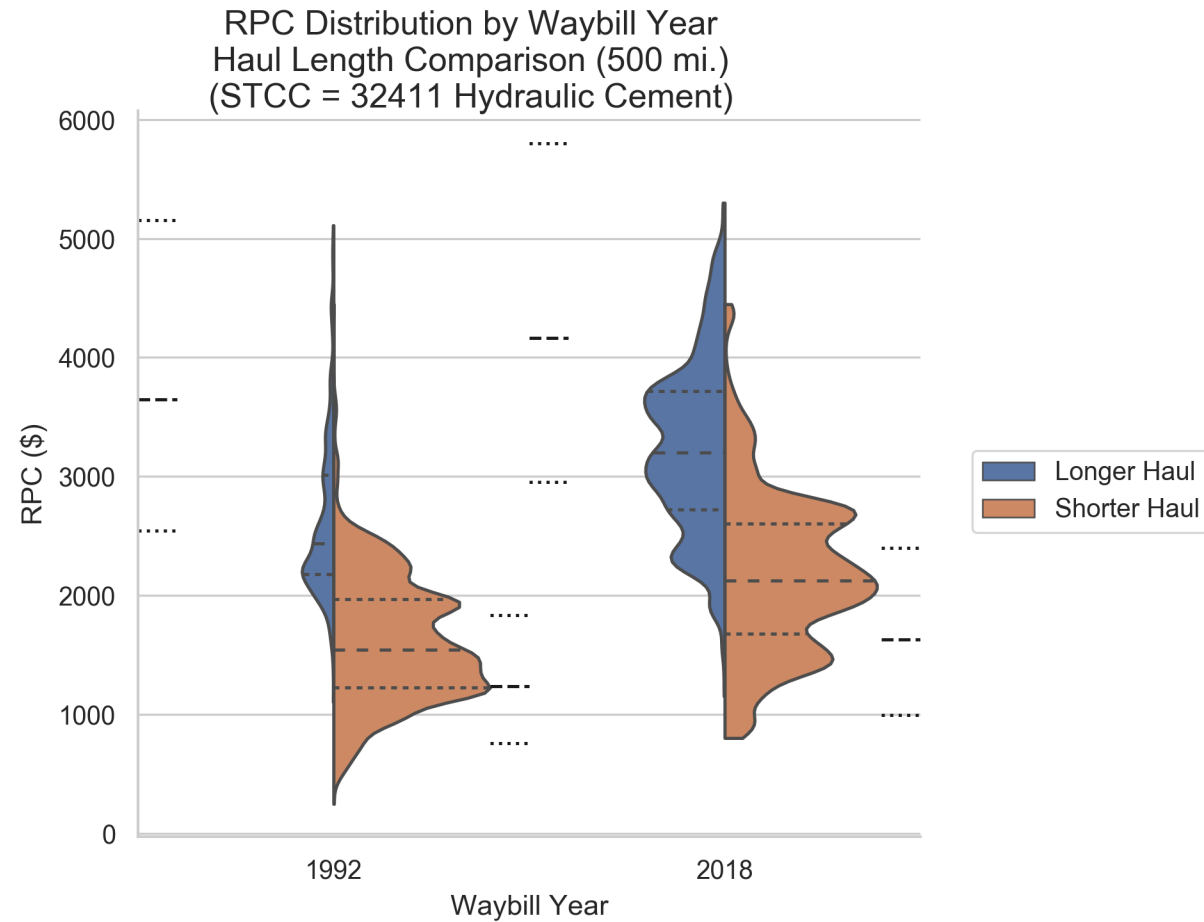
Requested by Parties	1441310	Industrial Sand
	26211	Newsprint
	26212	Ground Wood Paper Uncoated
	26218	Sanitary Tissue Stock
	26471	Sanitary Tissues or Health Products
	26611	Insulating Board
	26612	Construction Paper
	26613	Wallboard
	26614	Insulating Material
	26615	Construction Panels, Partitions
	26619	Building Paper or Building Board, Nec
	2818446	Anhydrous Ethyl Alcohol
	28422	Specialty Cleaning Bleaches
	2871450	Phosphate Fertilizer Solution
	29111	Gasoline or Jet or High Volatile Petroleum Fuels
	29112	Kerosene Exc. Jet Fuels
	2911610	Asphalt
	29521	Asphalt or Tar Saturated Felts, Boards or Roofing
	29523	Asphalt Sheathings, Shingles or Sidings

Other New Approach Elements

- Updated to compare 1992 to 2018
- Incorporated GIS-based “Geographic Modal Influences”
- Examined distribution of R/VC and RPC not just average

Geographic Modal Influences (Buckets)

- Potential Truck Influence
 - Shorter-haul moves less than 500 miles
- Potential Water Carrier Influence
 - Movement is within 30 miles of a port at both O and D
 - Ports are on same waterway
- Potential Railroad Influence
 - Movement is within 30 miles of an alternative railroad at both O and D
 - Alternative railroads connected by route and carry same commodity
 - No incumbent railroads involved



Data Sources



Ports Geographic Information	• U.S. Army Corps of Engineers (Ports) • U.S. Geological Survey (Watersheds)
Stations Geographic Information	• Centralized Station Master (Station Lat/Long) • Mark Register (RR Marks)
Movement Information	• 2018 Waybill Sample • 1992 Waybill Sample • Bureau of Economic Analysis (GDP Price Deflator)

The Tools

- SQL Server for data cleaning, table setup, archiving, and to move data between platforms
- ArcGIS Pro 2.5 for mapping waybill records, nearby rail options, ports, and navigable waterway systems
- Python 3 to control programmatic GIS implementation, data visualization, and data exploration
- Microsoft Excel for Dashboards



Technical Approach

Prep Data

- Transform
- Clean

GMIM

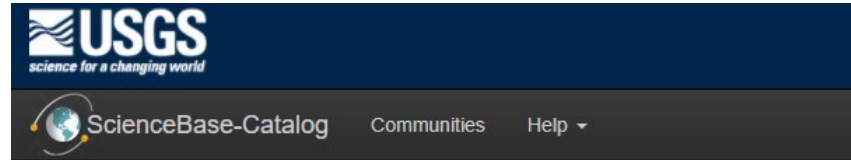
- Geospatial Analysis
- Influence Buckets

Tools

- Visualization
- Indicator Dashboard

GMIM – Water Influence

Example Watershed Bounds



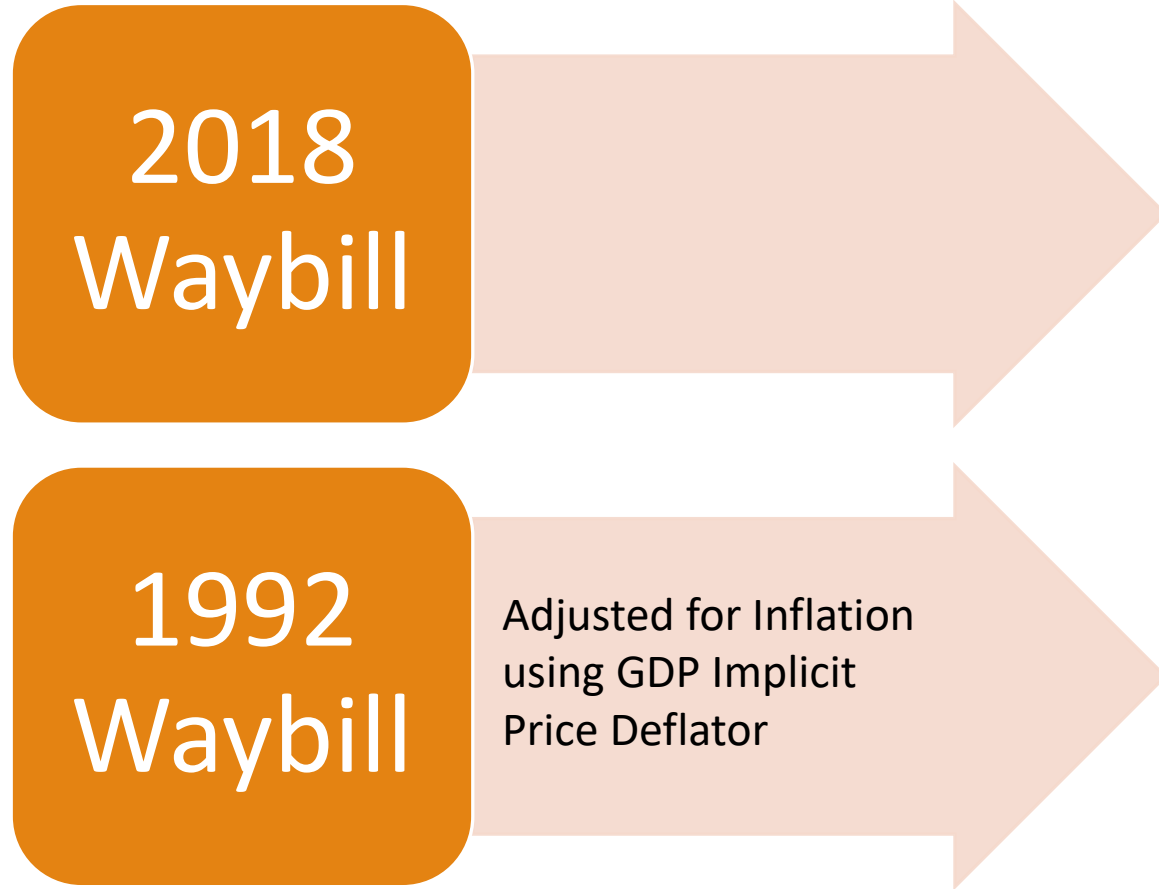
North America Watersheds



- Atlantic Ocean
- Pacific Ocean
- Mississippi River
- Gulf of Mexico
- Great Lakes

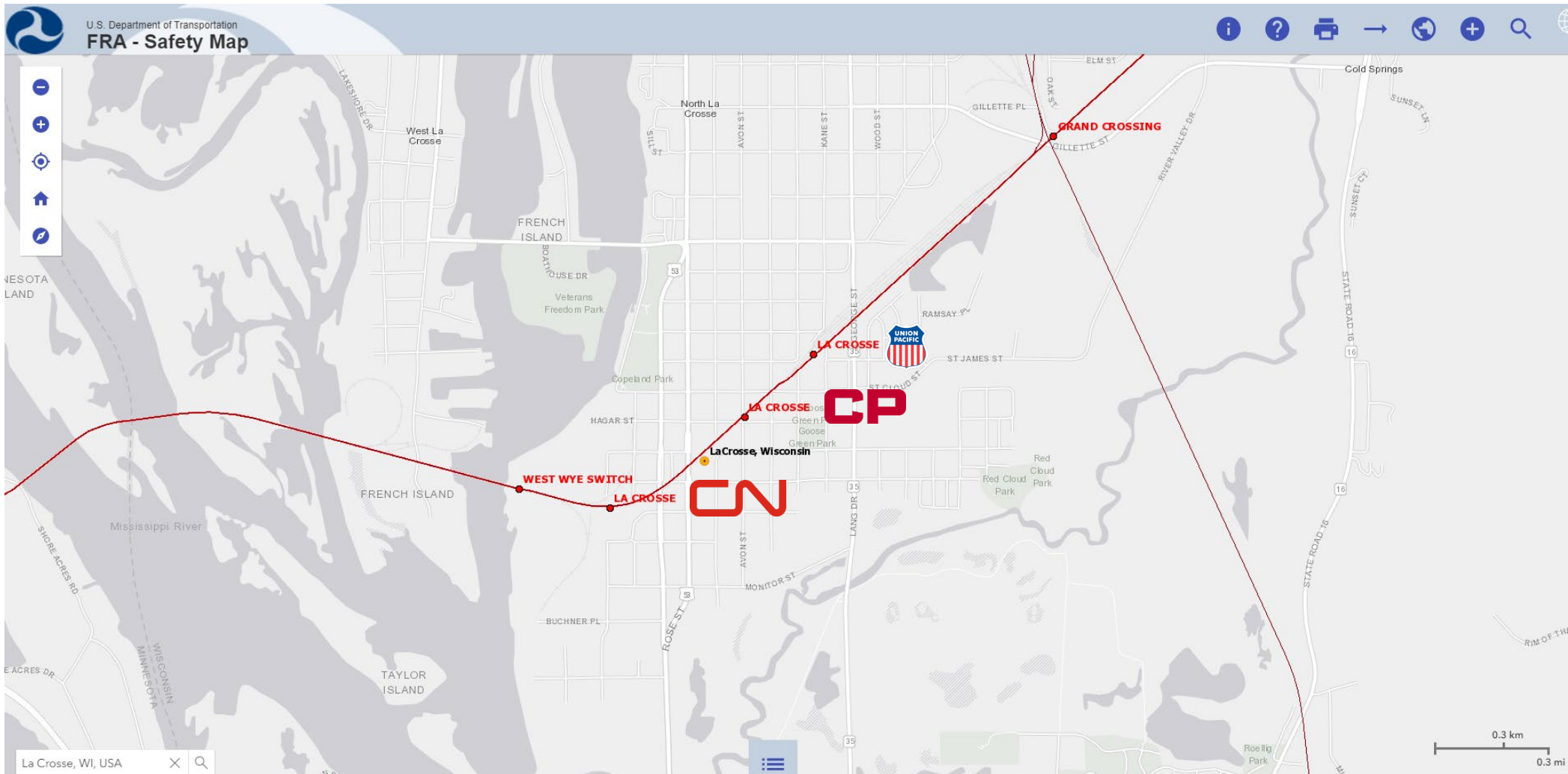
Operationalizing Ports Data

- Army Corps of Engineers Port Facilities Data
- Data loaded into ArcGIS 2.5
- Removed eastern hemisphere ports
- Removed ports outside the contiguous United States
- Removed ports which were not reported capable of handling commodities
- Assigned ports to waterway systems using North American Watershed Data

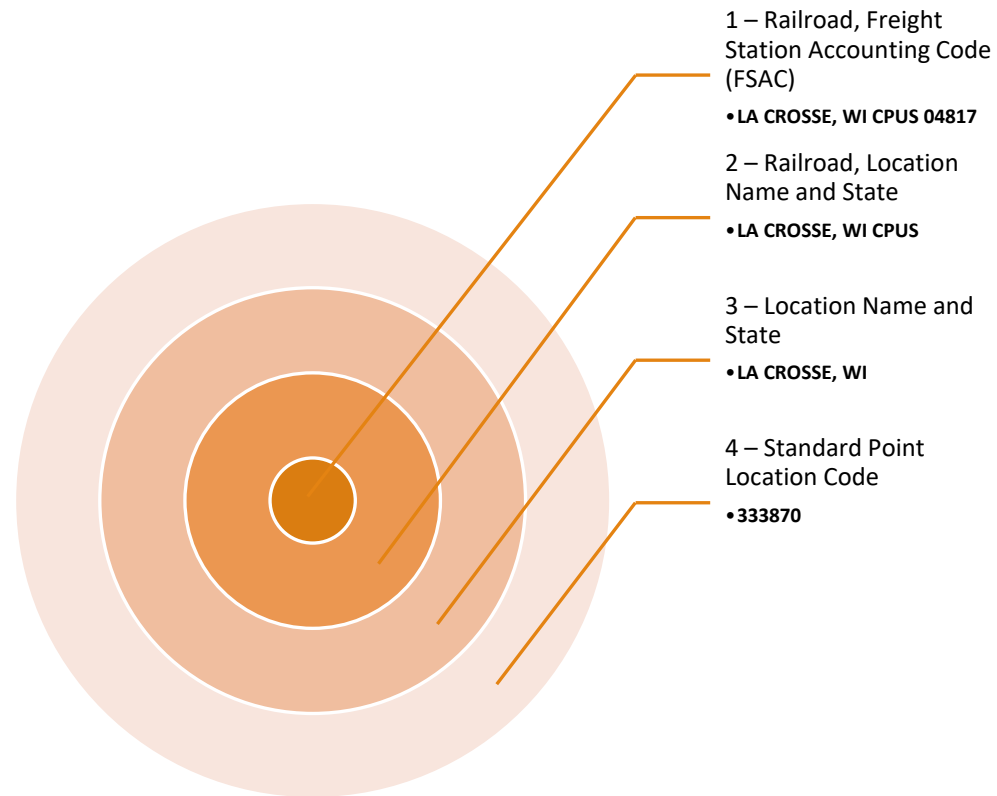


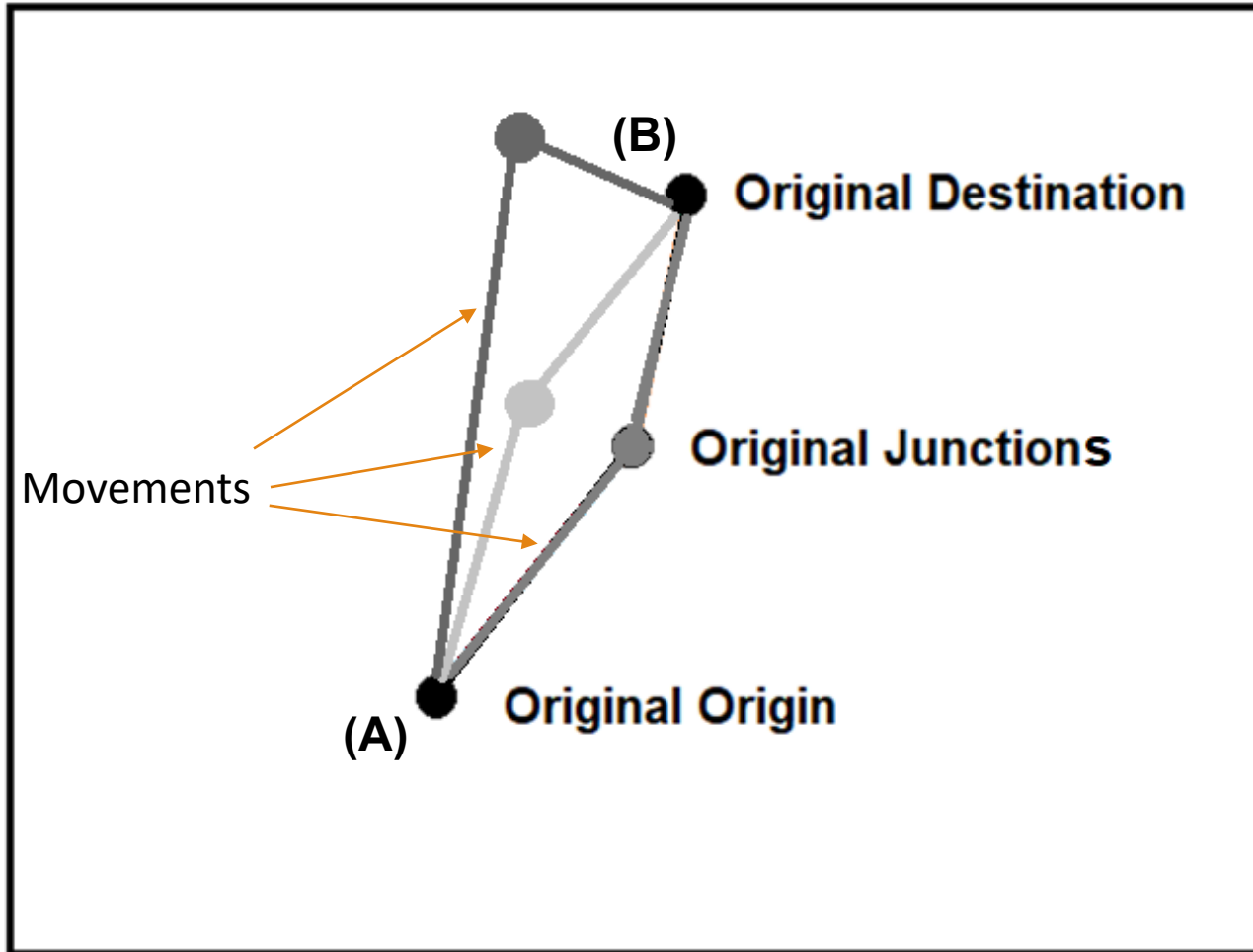
Microsoft®
SQL Server®





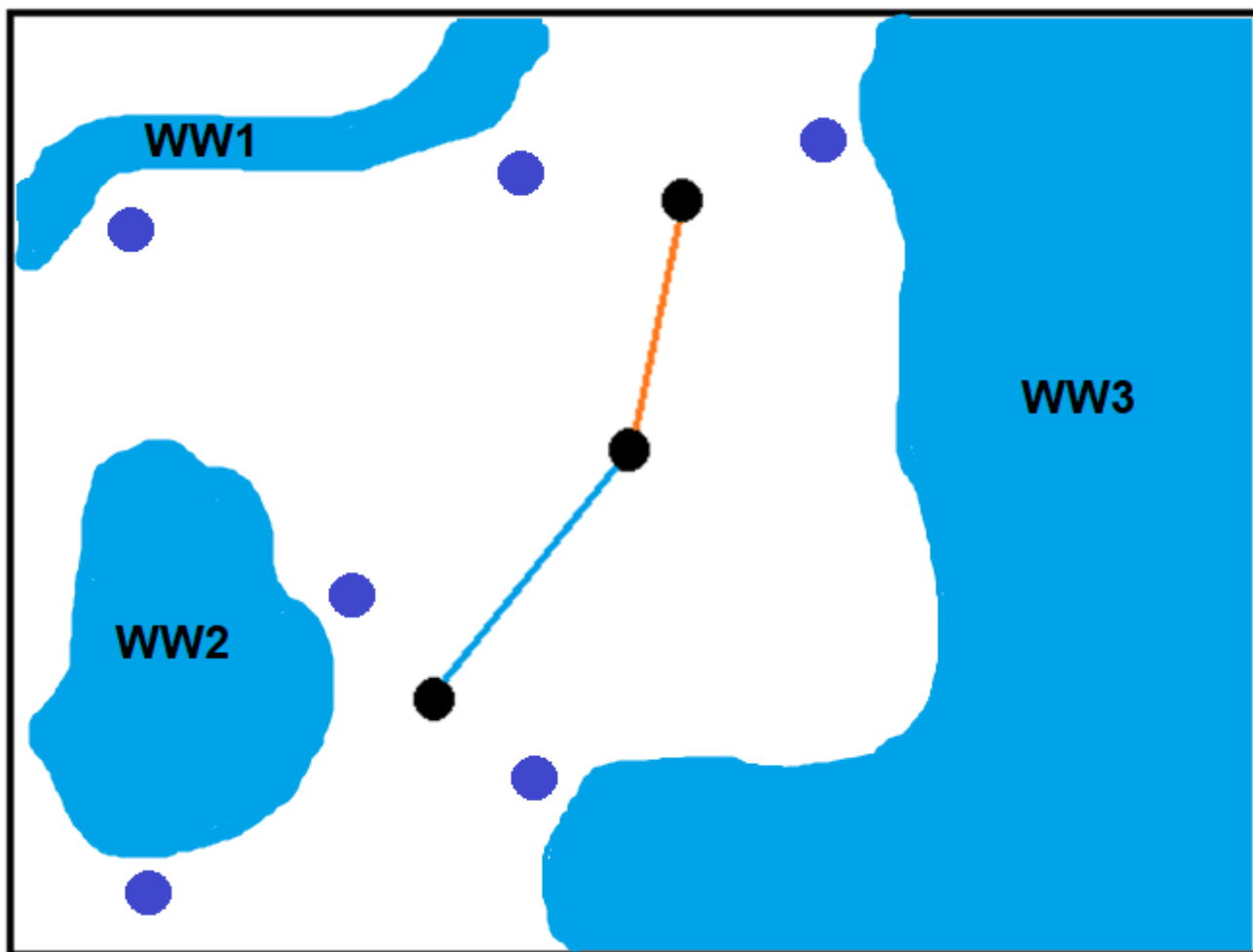
Rail Station Geocoding



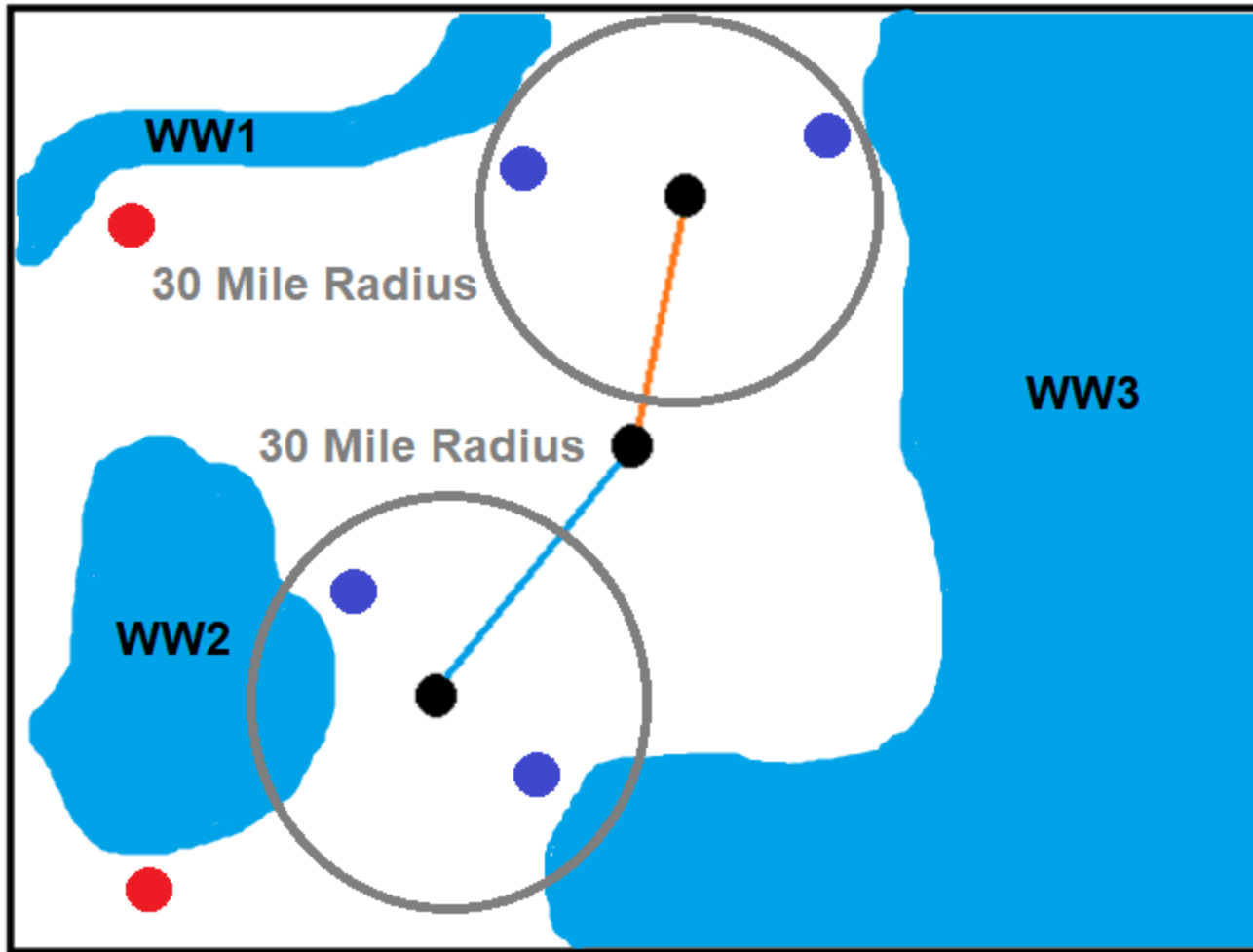


Waybill Lane

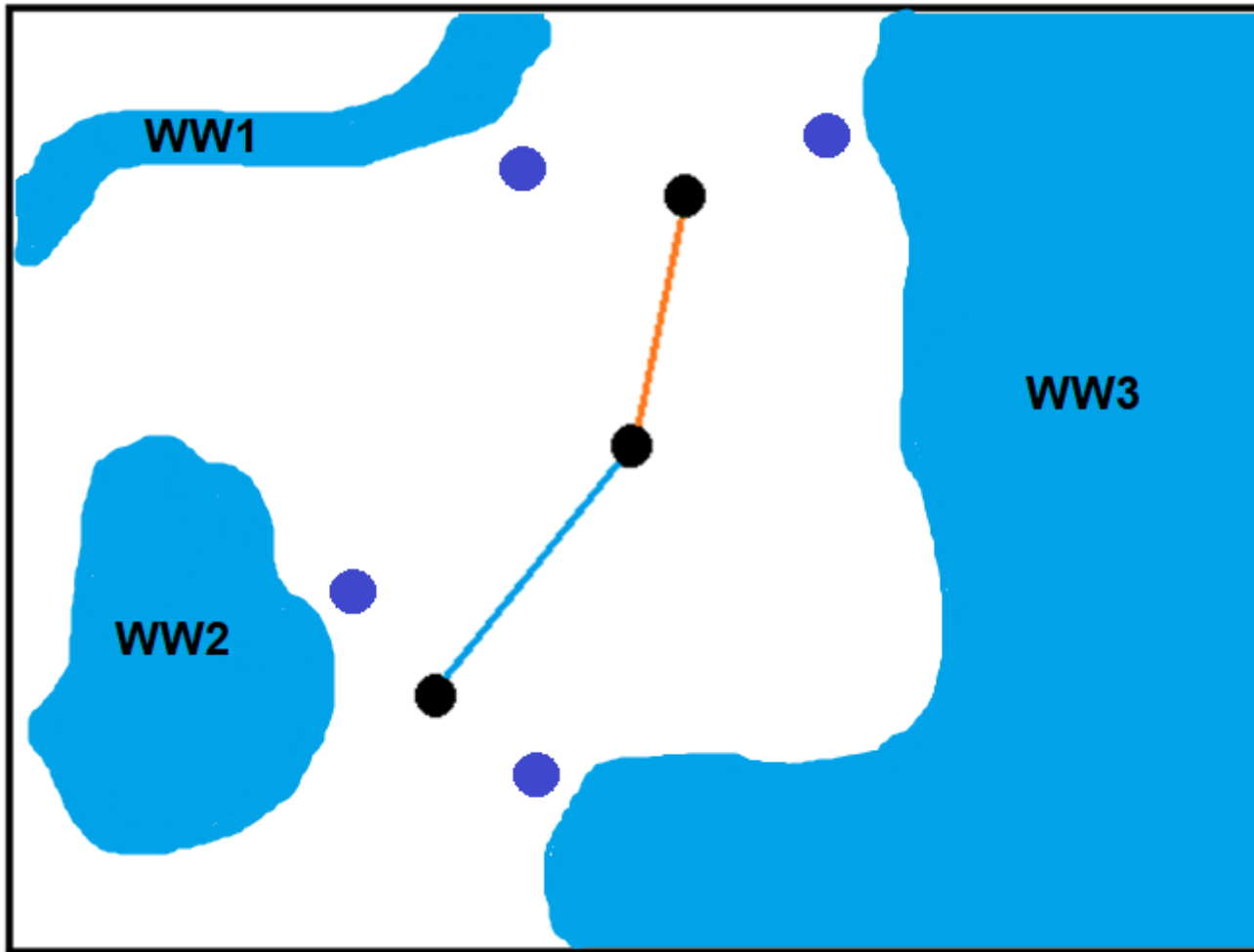
ALL MOVEMENTS FROM A TO B ARE
PART OF THE A-B WAYBILL LANE



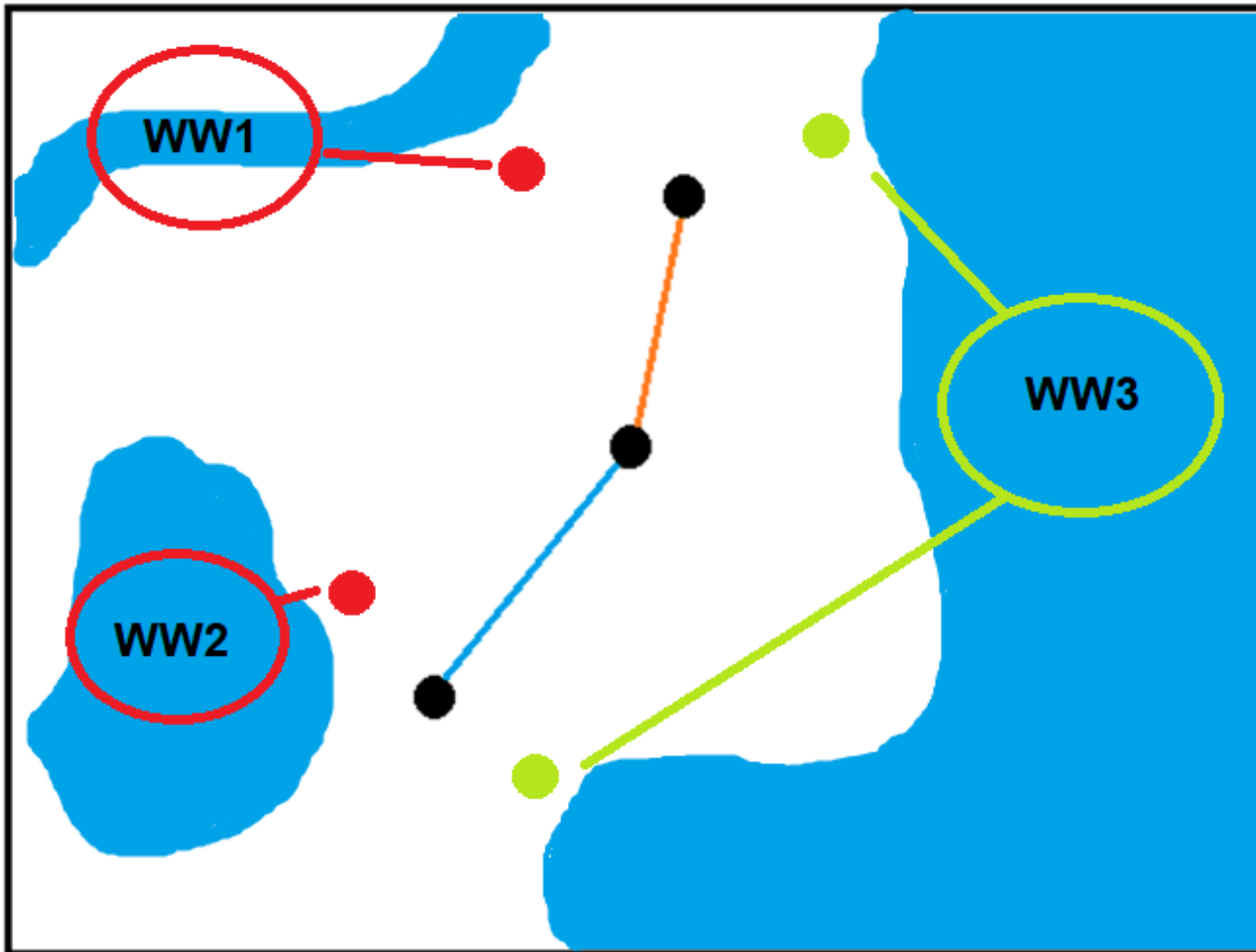
Identify Ports



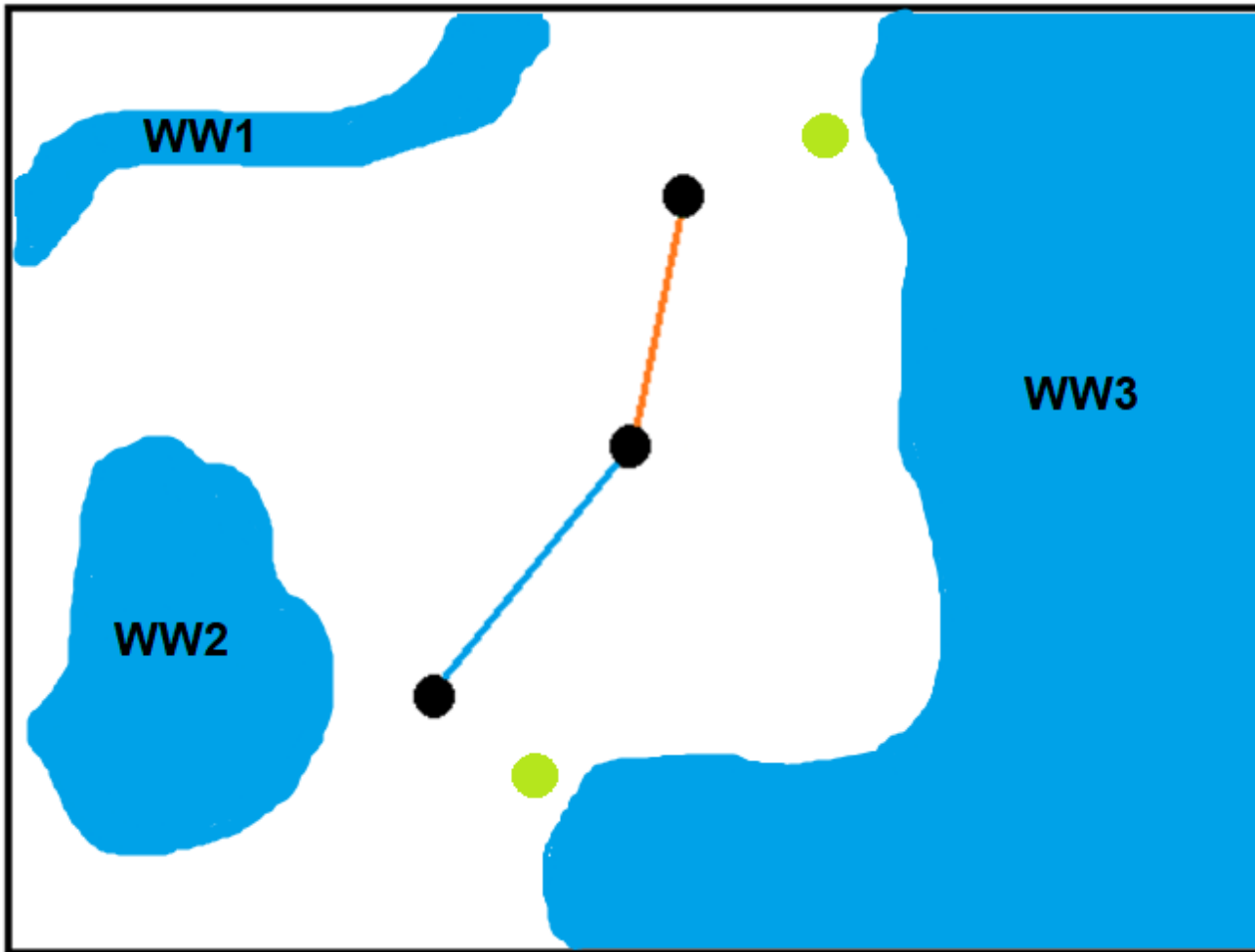
Apply the 30
Mile Radius to
Nearby Ports



Drop Ports
Outside 30 Mile
Radius



Determine if
Ports are
Connected by
Waterway

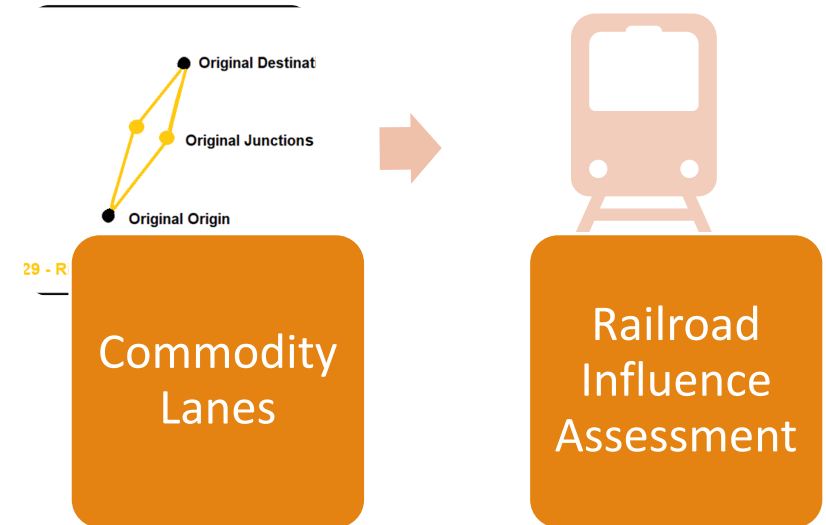
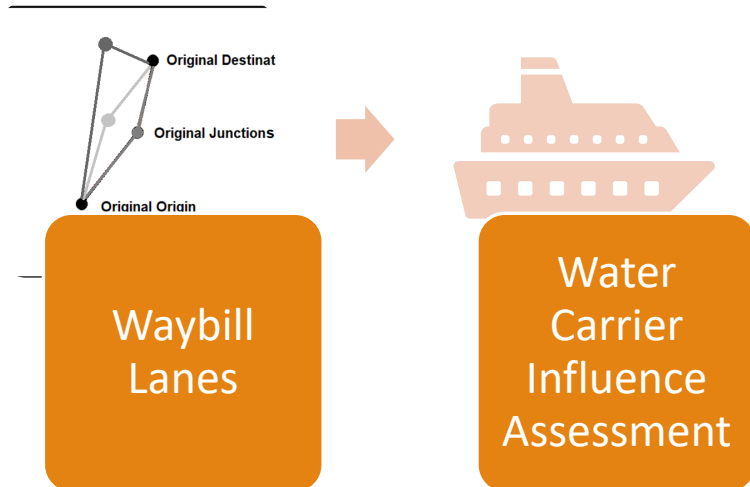


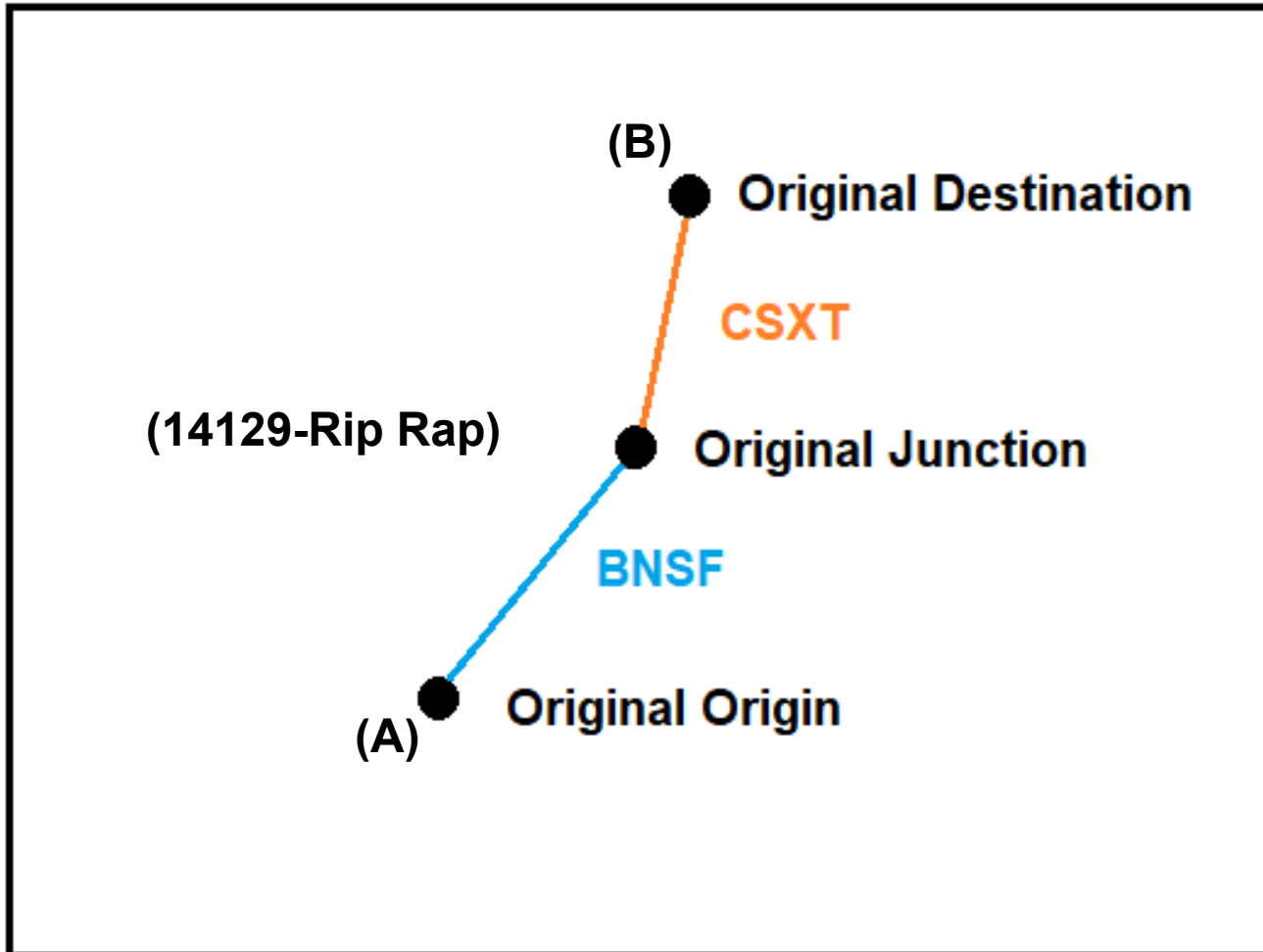
Drop Ports Not Connected by Waterway

ALL MOVEMENTS ON THIS WAYBILL
LANE WOULD BE CODED AS HAVING
A WATER CARRIER ALTERNATIVE

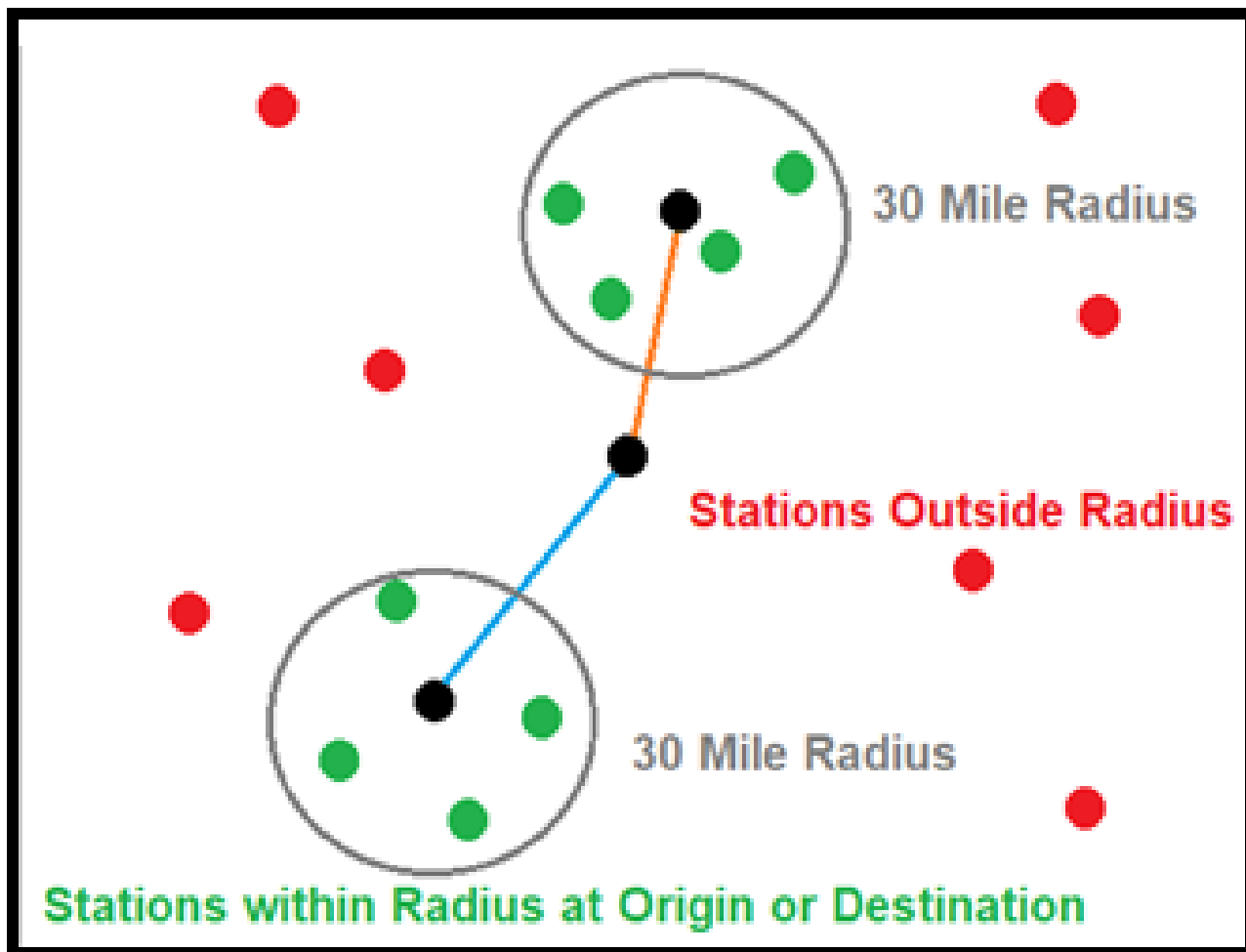
GMIM – Rail Influence

Water Carrier and Railroad Influences

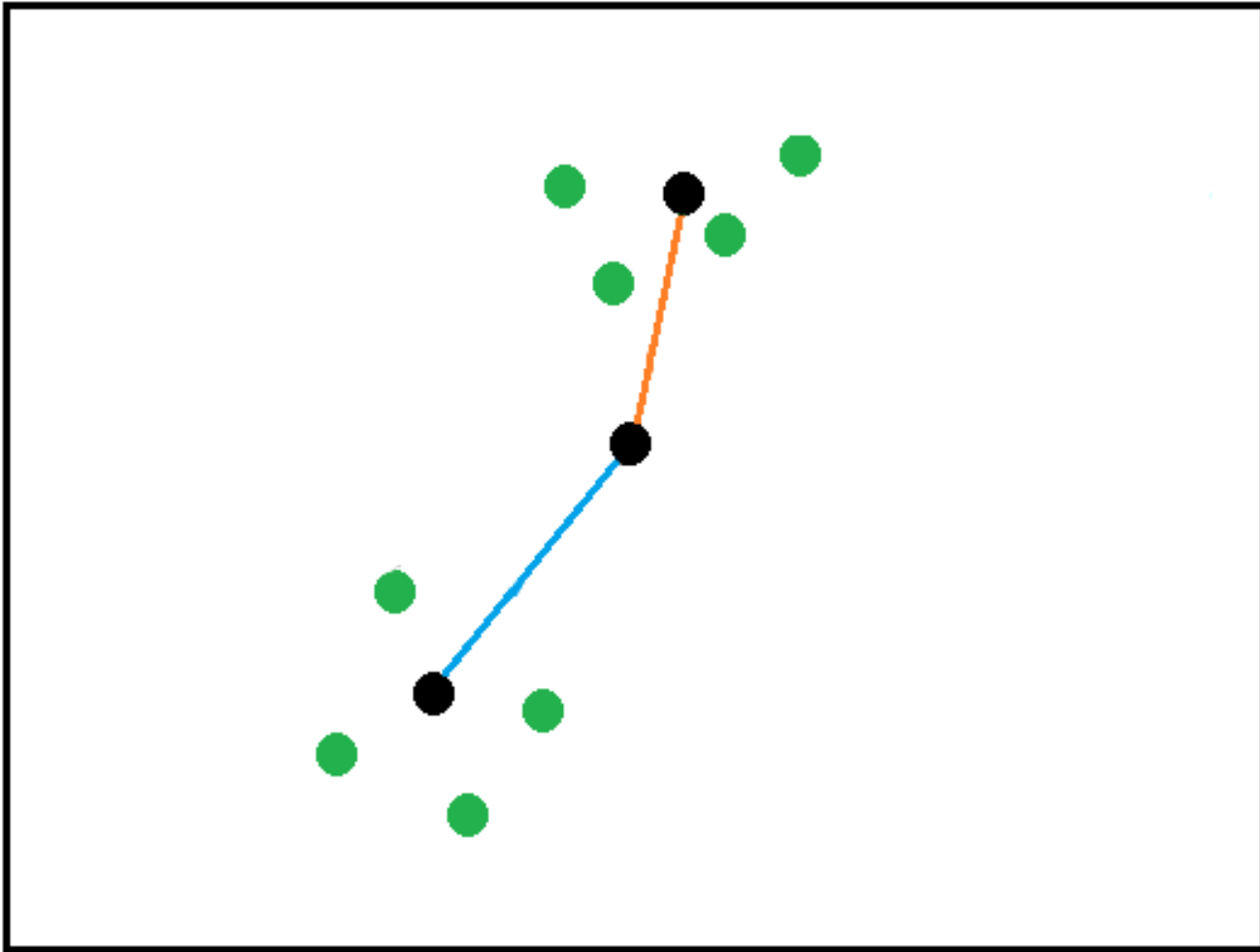




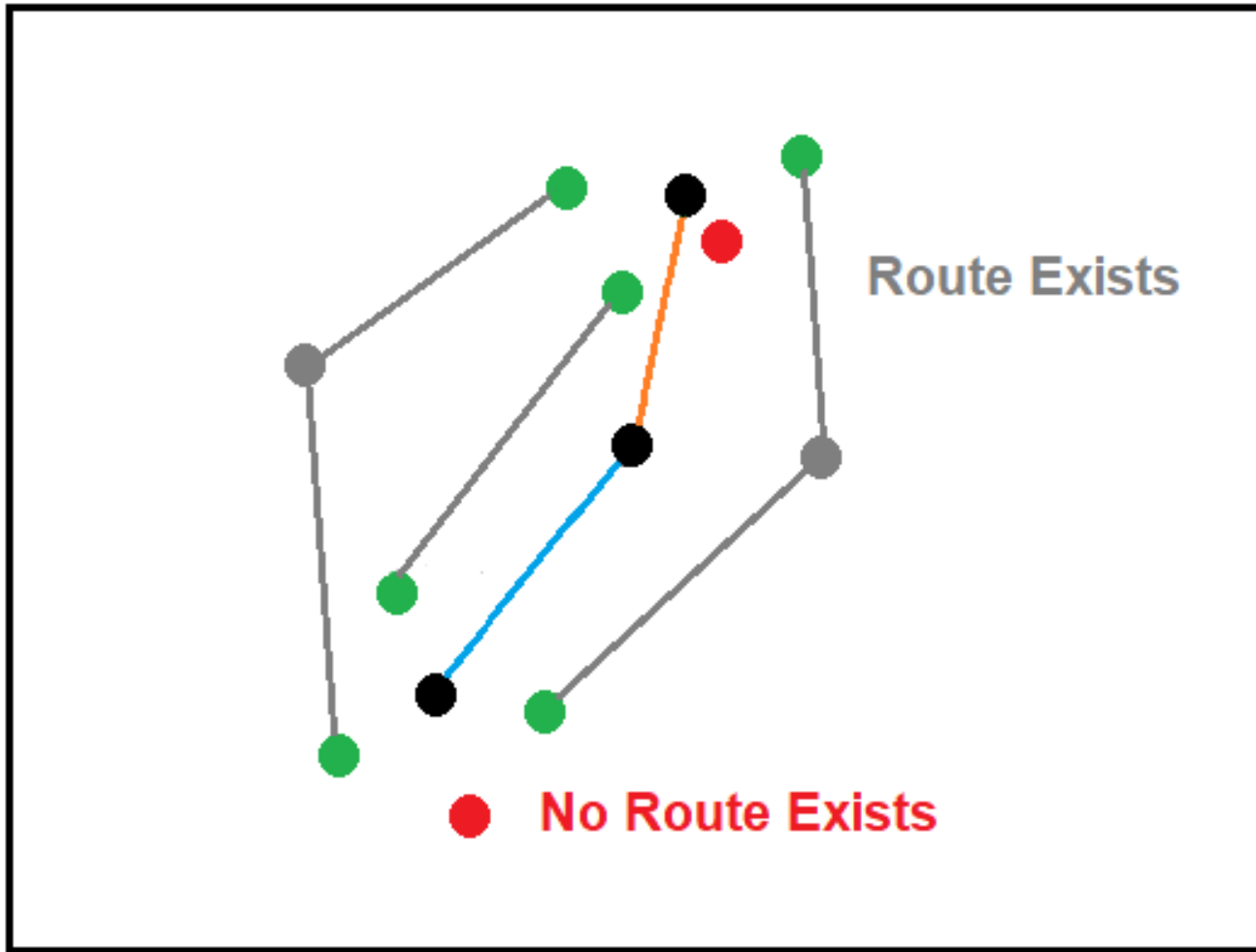
Original
Movement
Sorted into
Commodity Lane
A-B-Rip Rap



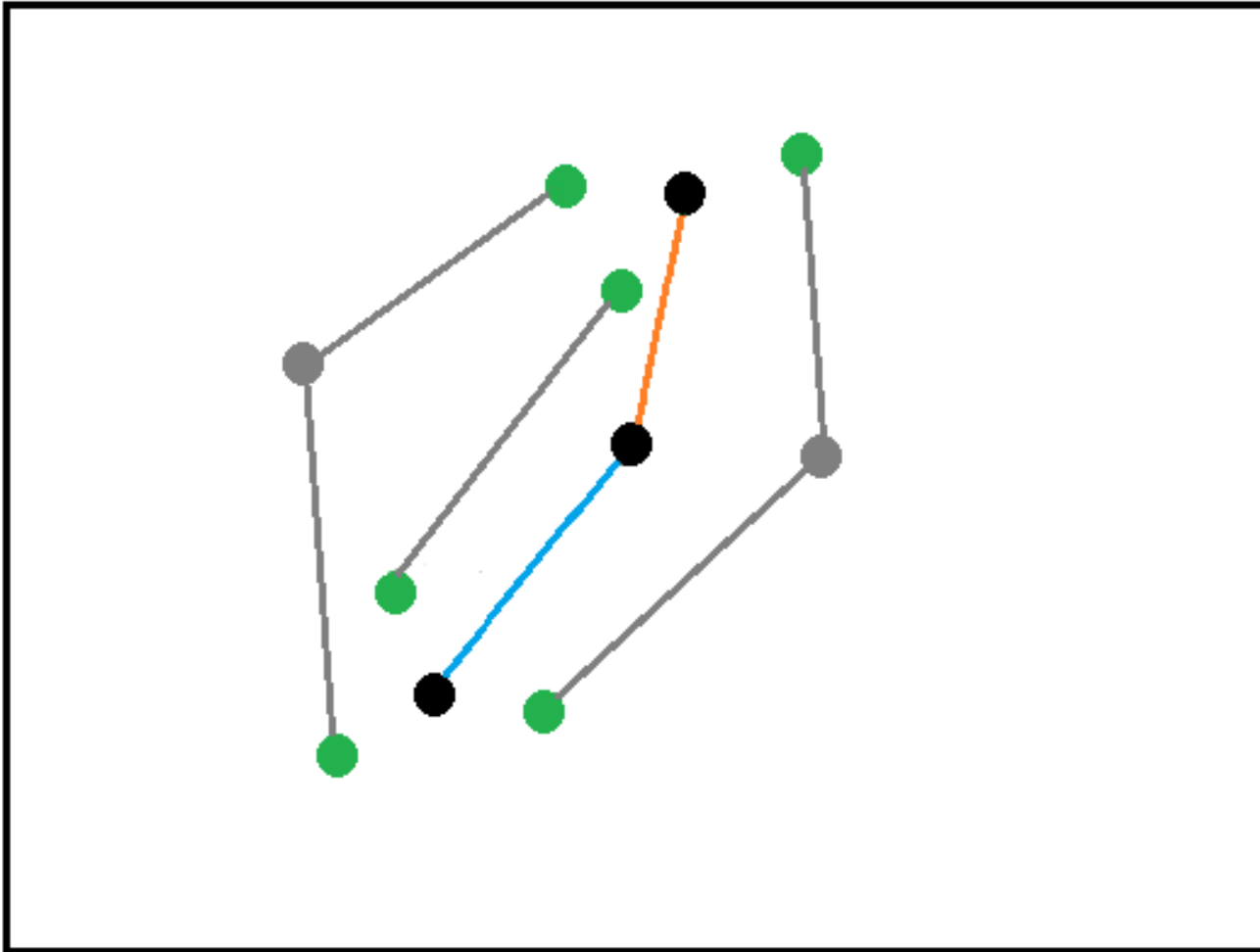
Apply the 30
Mile Radius to
Nearby Stations



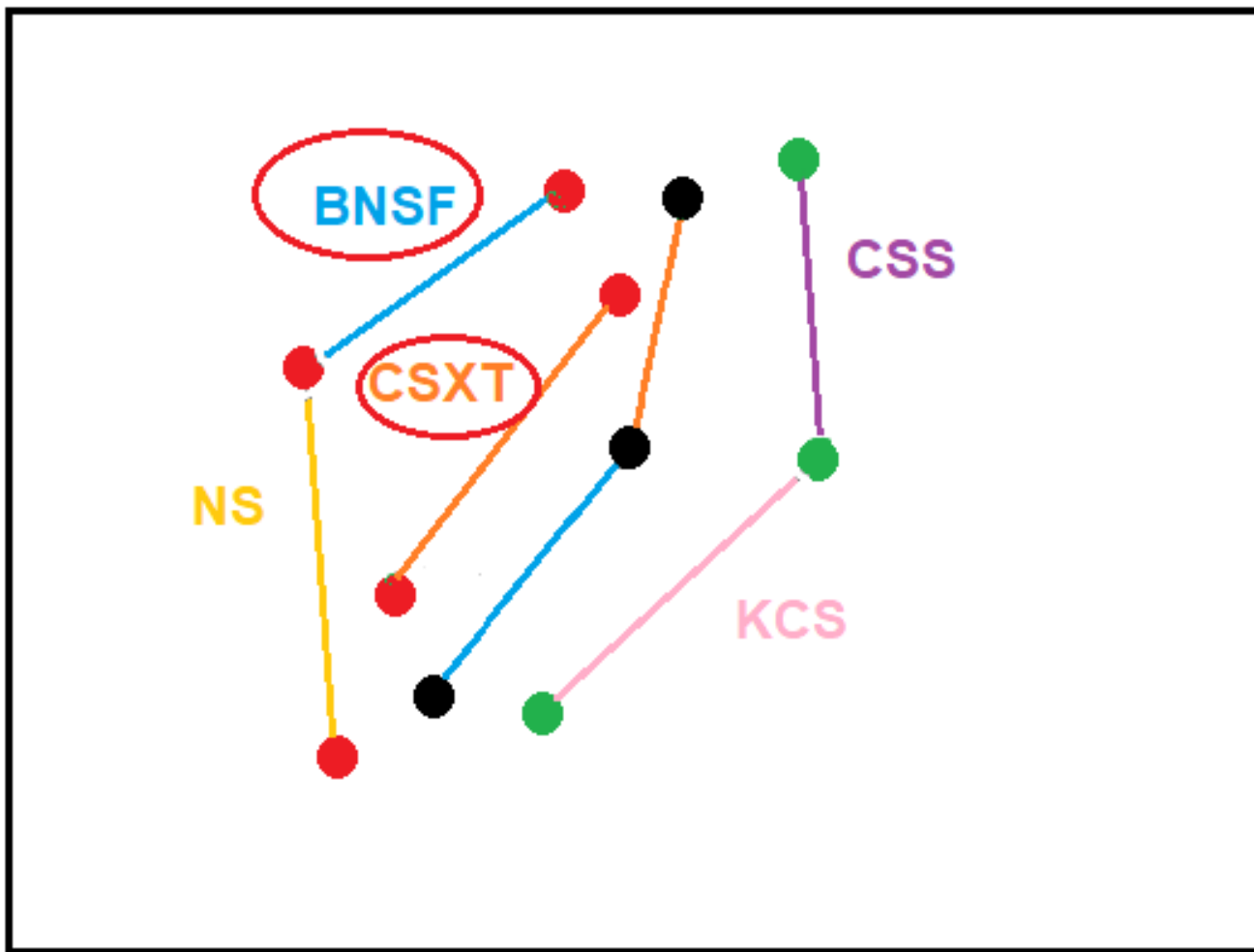
Drop Stations
Outside 30 Mile
Radius



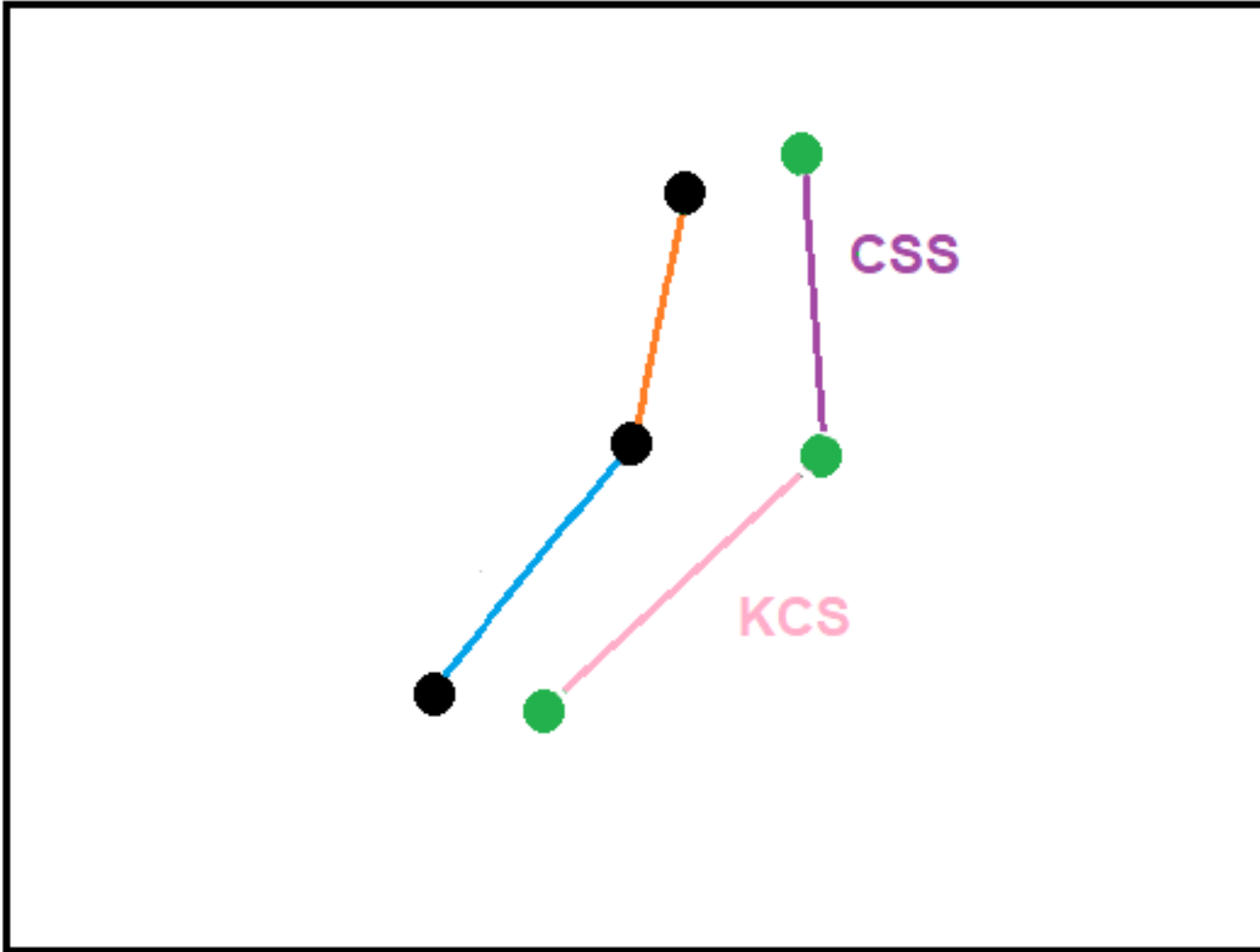
Identify
Commodity Lanes
in Waybill Data
Connecting
Alternate Stations



Drop Stations
Not on an
Alternate
Commodity Lane

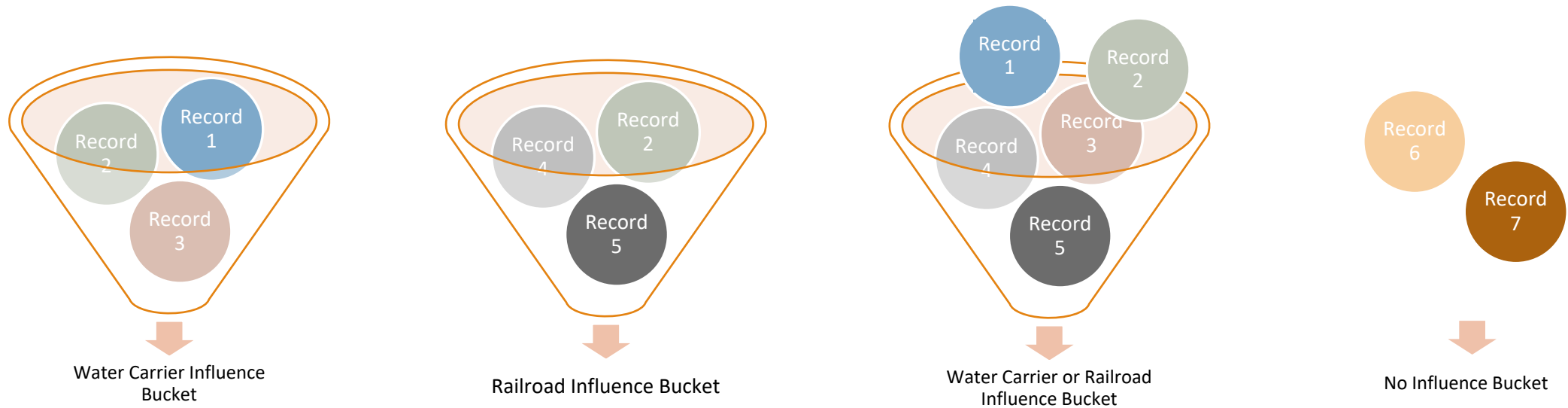


Evaluate Railroads
in Alternate
Commodity Lanes

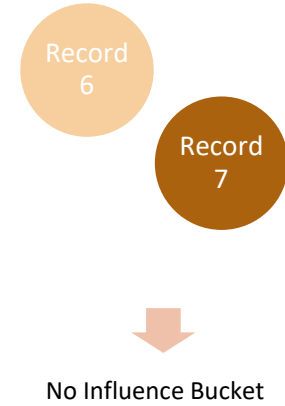
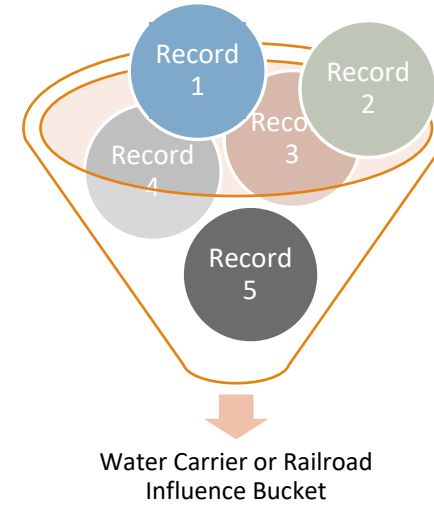
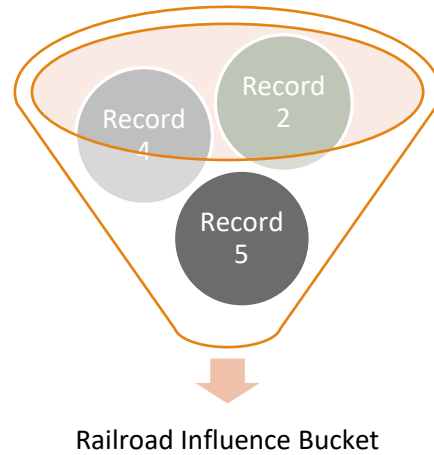
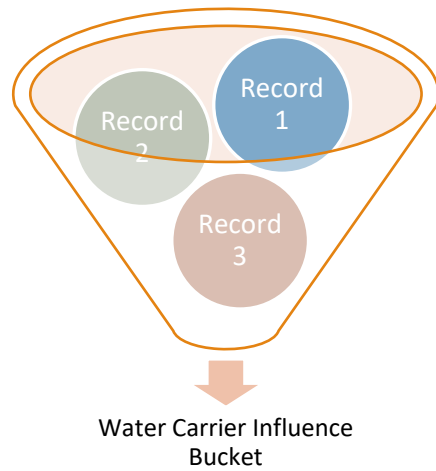


Drop Alternatives
Involving
Incumbent
Railroads

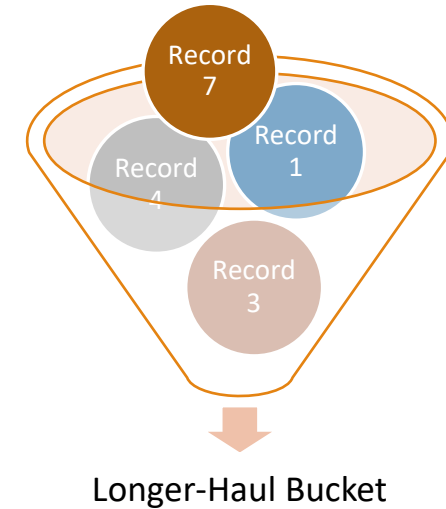
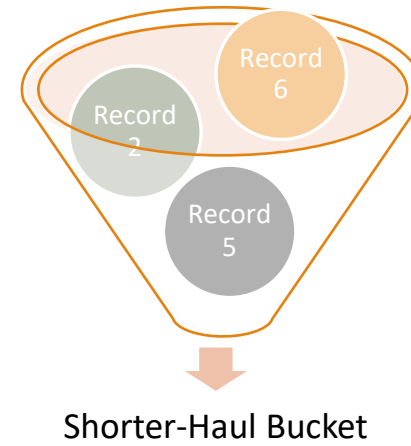
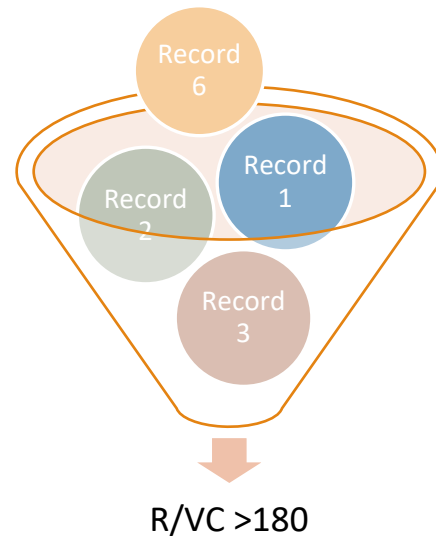
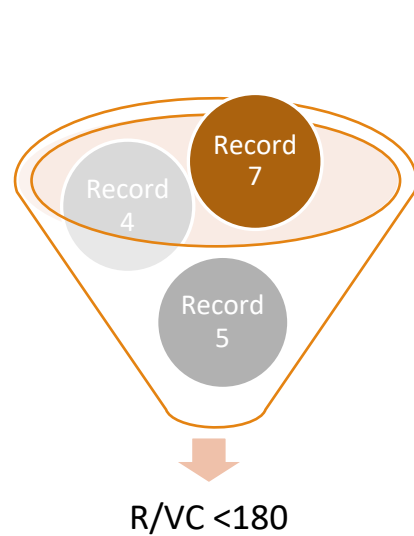
Railroad/Water Carrier Buckets



Railroad/Water Carrier Buckets



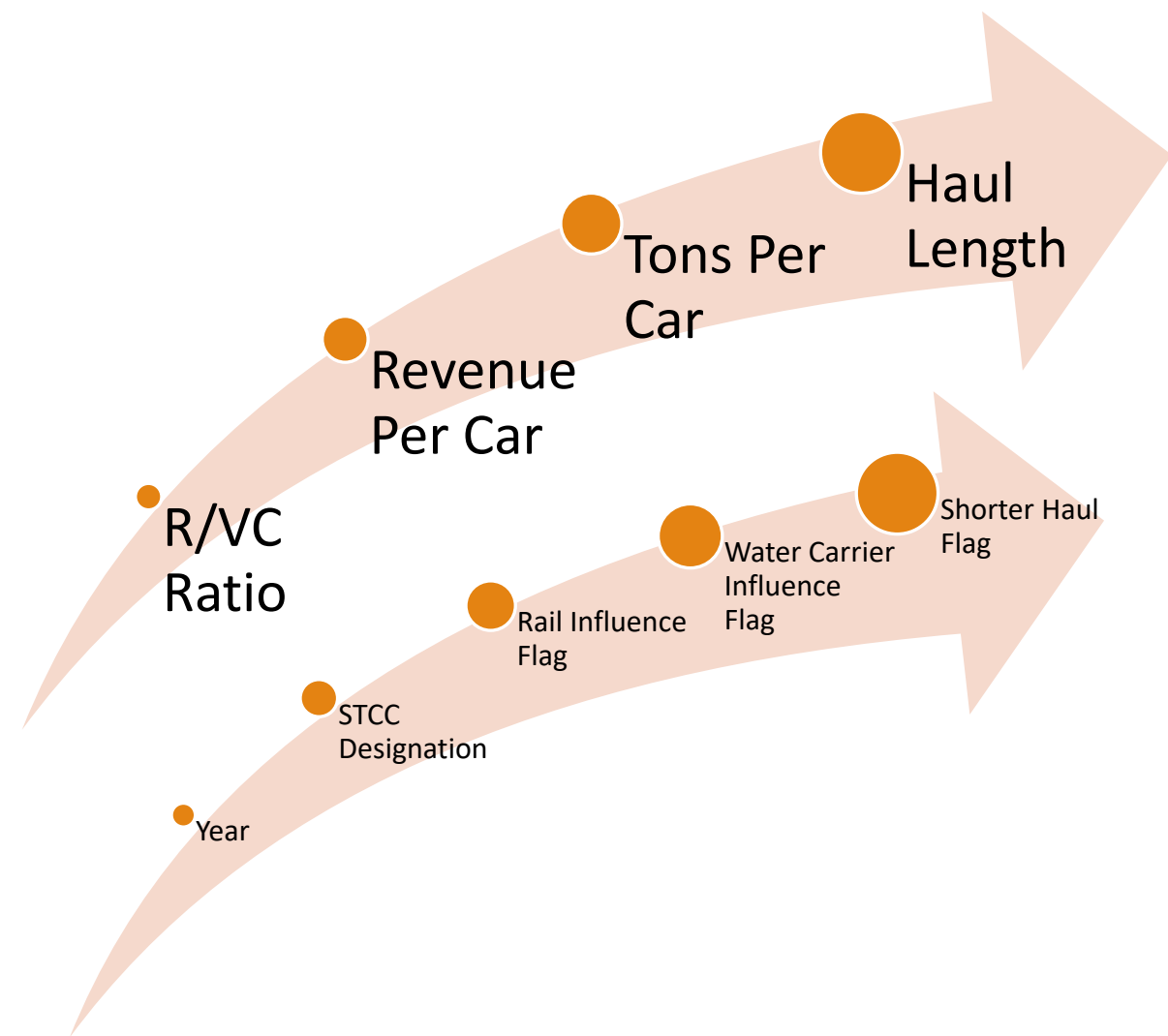
R/VC
Ratio
Buckets



Haul
Length
Buckets

Tools:

Data Visualizations

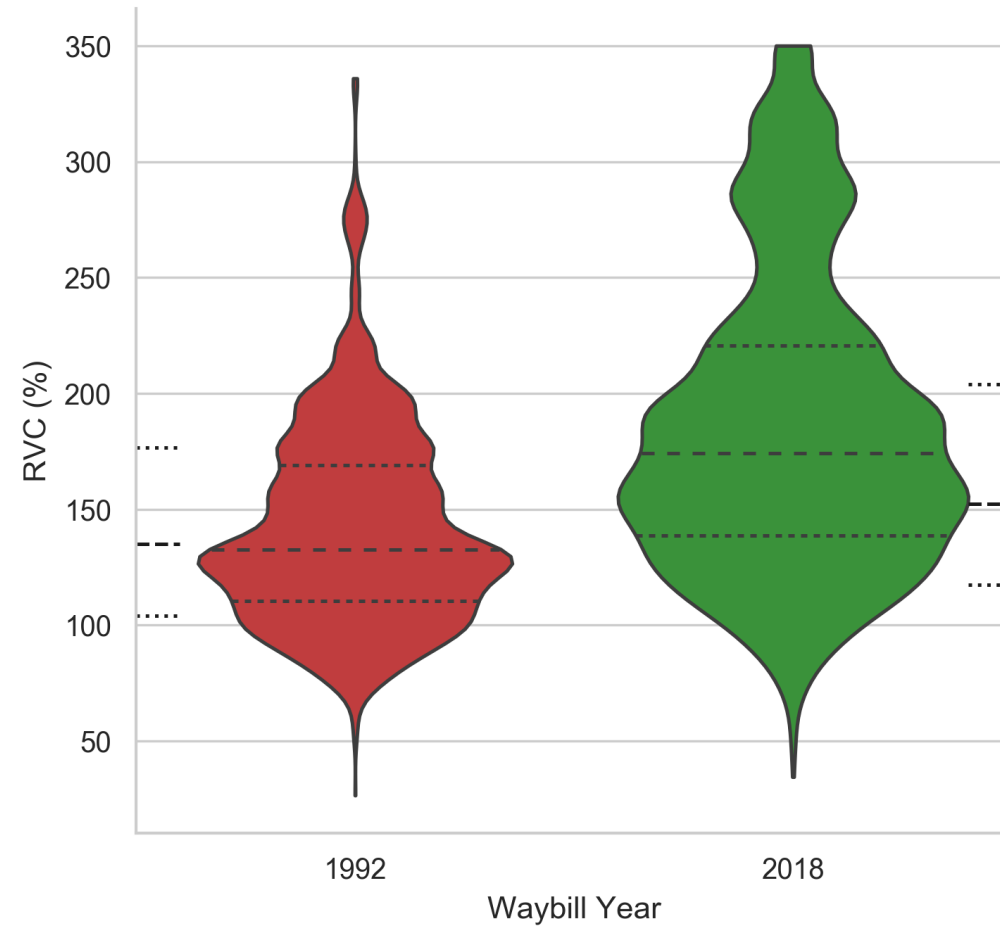


Data Visualizations

Bivariate Distribution Matrix by Waybill Year
(STCC = 32411 Hydraulic Cement)
[n = 100]

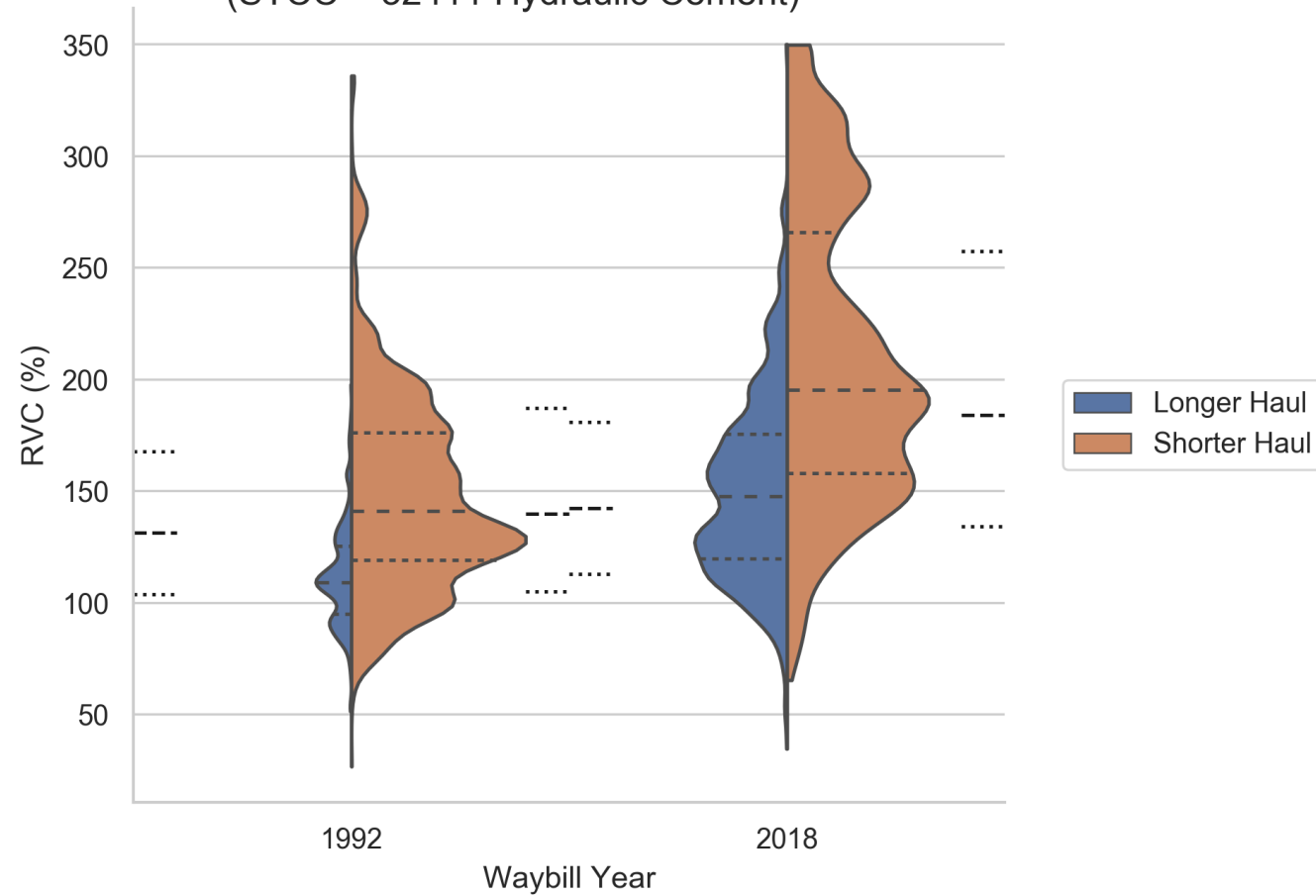


RVC Distribution for All Traffic by Waybill Year
(STCC = 32411 Hydraulic Cement)



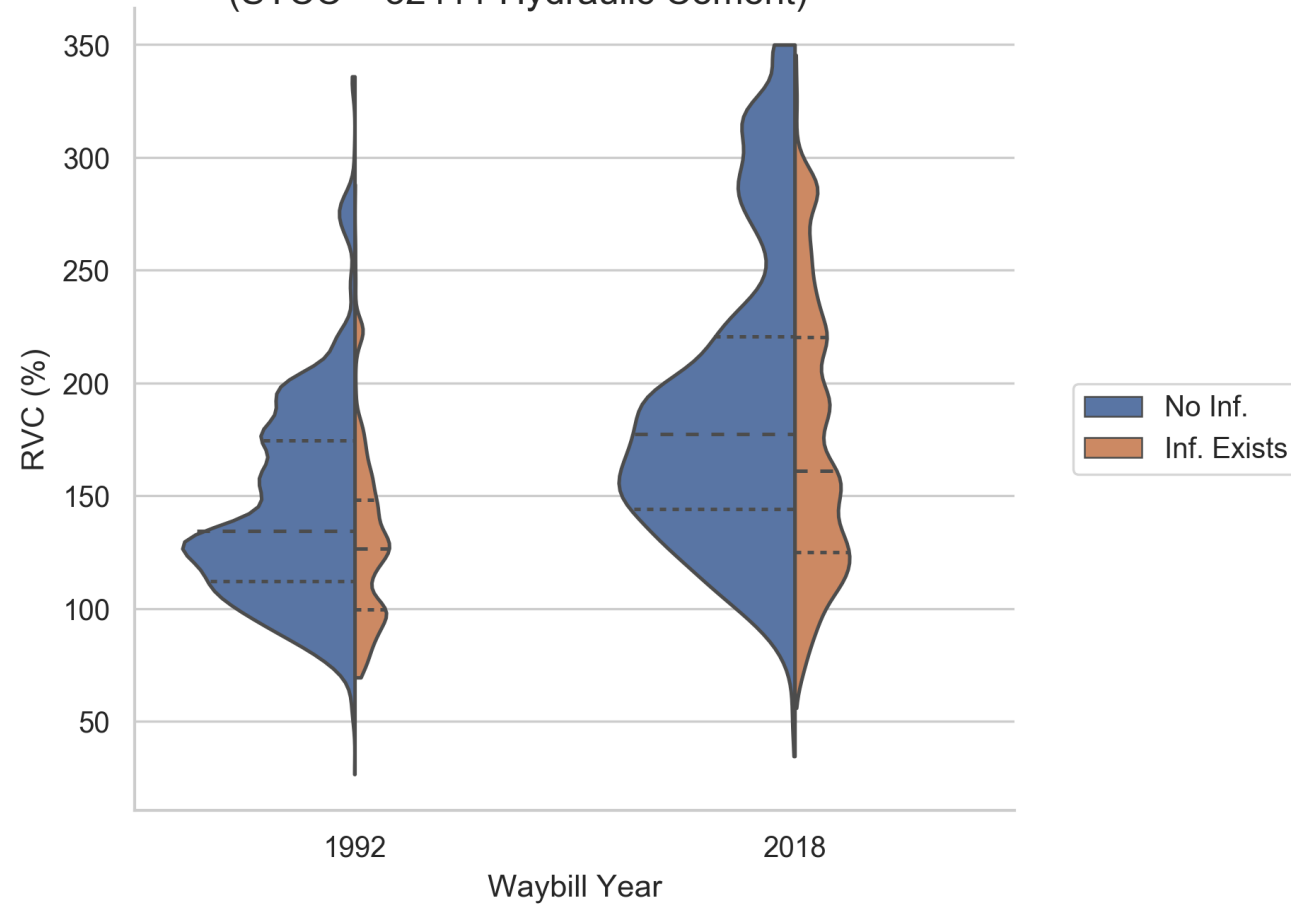
Item	1992	2018	Change
Avg. Haul Length (Mi.)	364.5	508.7	39.6%
No. of Waybills	3,081	3,966	28.7%
Cars	173,198	216,614	25.1%
Revenue	\$311,459,999	\$561,897,456	80.4%

RVC Distribution by Waybill Year
Haul Length Comparison (500 mi.)
(STCC = 32411 Hydraulic Cement)



Item	1992	1992	2018	2018
Modal Influence	No Inf.	Inf. Exists	No Inf.	Inf. Exists
Avg. Haul Length (Mi.)	774.8	271.3	809.2	309.6
No. of Waybills	570	2,511	1,580	2,386
Cars	29,420	143,778	76,778	139,836
Revenue	\$78,765,302	\$232,694,697	\$258,260,090	\$303,637,366

RVC Distribution by Waybill Year
 Rail or Water Influence Comparison
 (STCC = 32411 Hydraulic Cement)

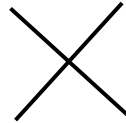


Item	1992		2018	
Modal Influence	No Inf.	Inf. Exists	No Inf.	Inf. Exists
Avg. Haul Length (Mi.)	386.8	273.5	536.3	421.6
No. of Waybills	2,473	608	3,011	955
Cars	144,306	28,892	168,662	47,952
Revenue	\$267,102,184	\$44,357,815	\$452,902,072	\$108,995,384

37 Visualizations Per Commodity

3 Variables Shown on Violin Vertical Axis:

1. R/VC Ratio
2. Revenue Per Carload
3. Haul Length



1 Pair Plot:

1. R/VC Ratio
2. Revenue Per Car
3. Tons Per Car
4. Haul Length

12 Violin Plots Showing Different Cuts of 1992 and 2018 Data:

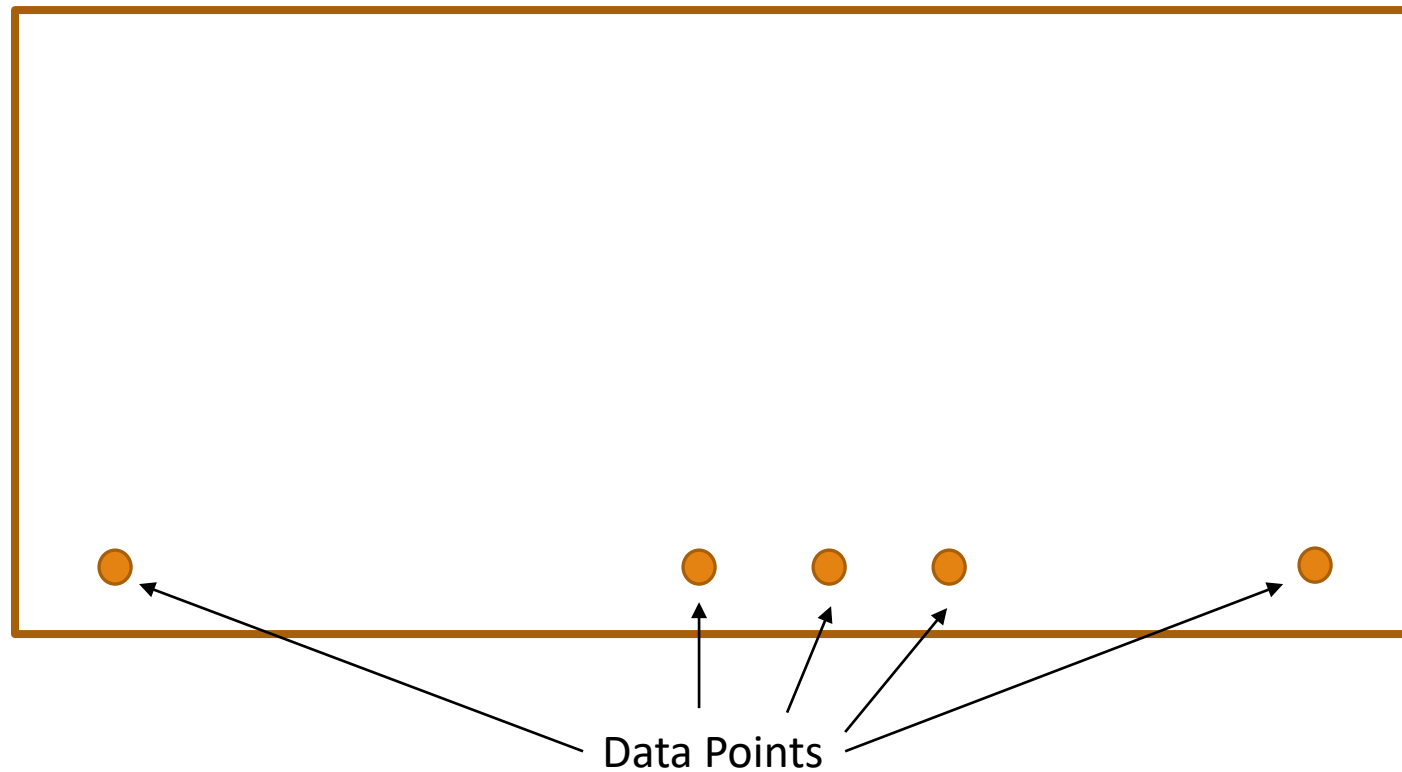
1. All Traffic
2. RVC>180 Traffic
3. Longer-Haul vs Shorter-Haul Influence
4. RR or Water Influence
5. RR Influence
6. Water Influence
7. Shorter-Haul RR or Water Influence
8. Shorter-Haul RR Influence
9. Shorter-Haul Water Influence
10. Longer-Haul RR or Water Influence
11. Longer-Haul RR Influence
12. Longer-Haul Water Influence



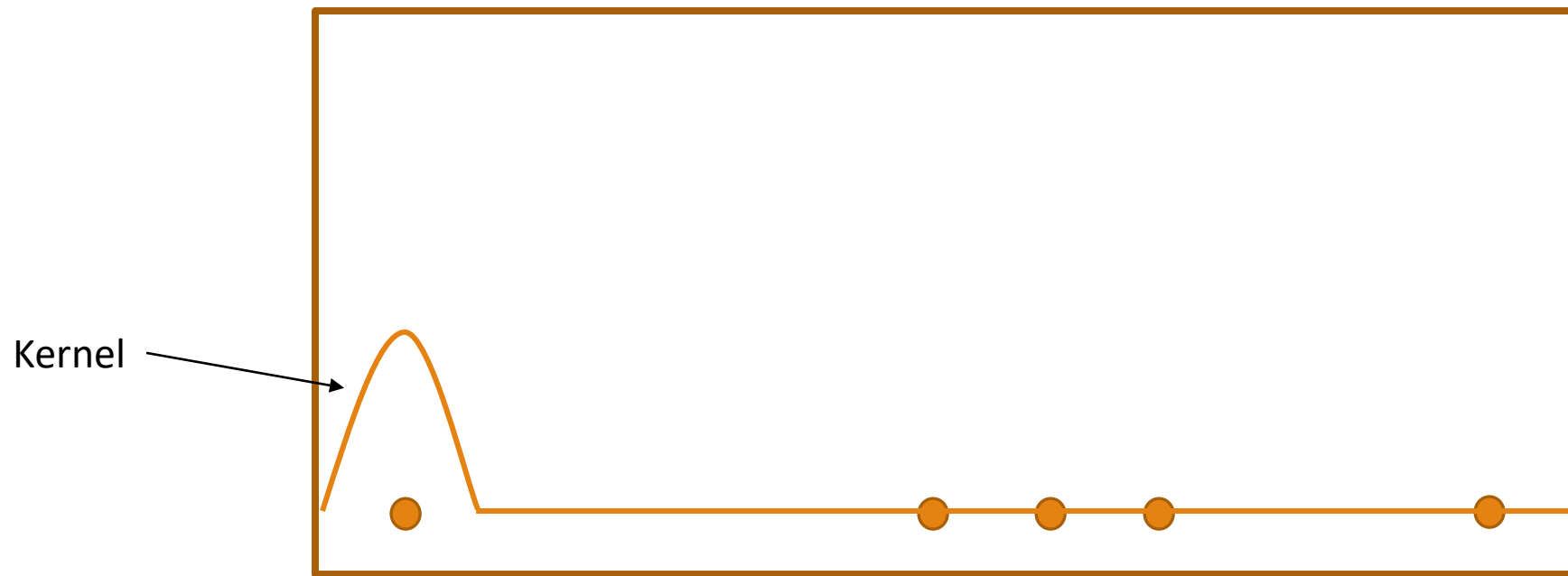
matplotlib



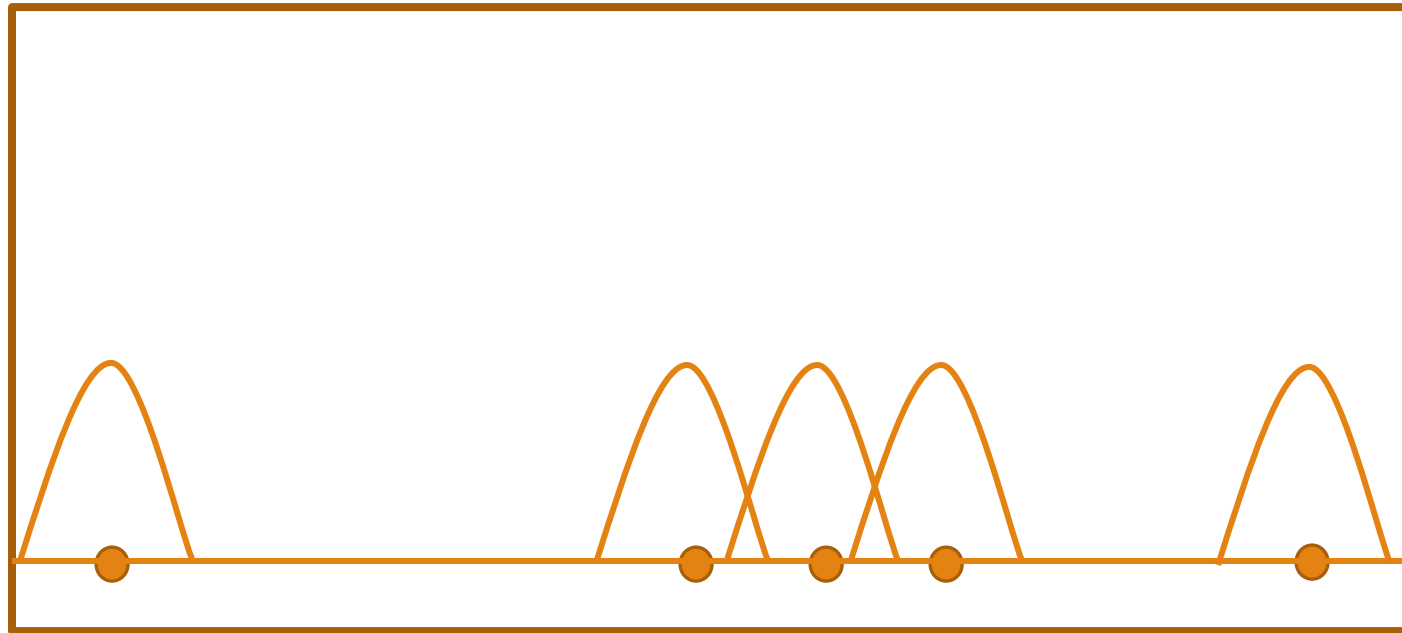
Kernel Density Estimation



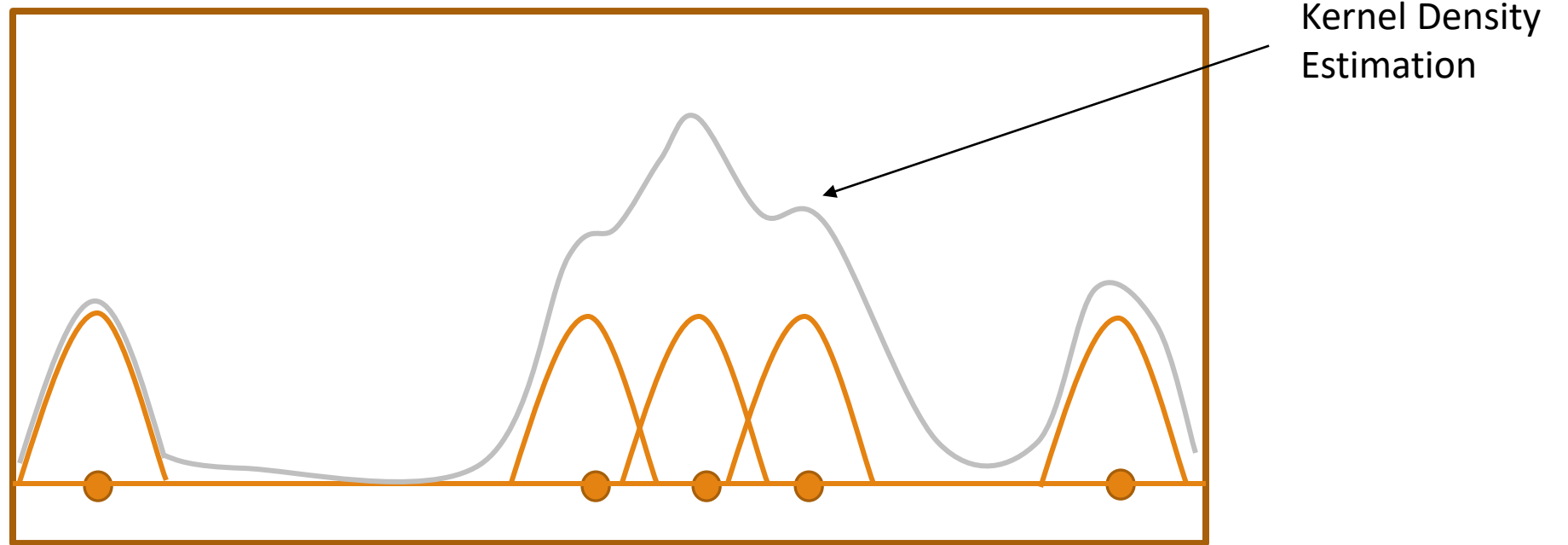
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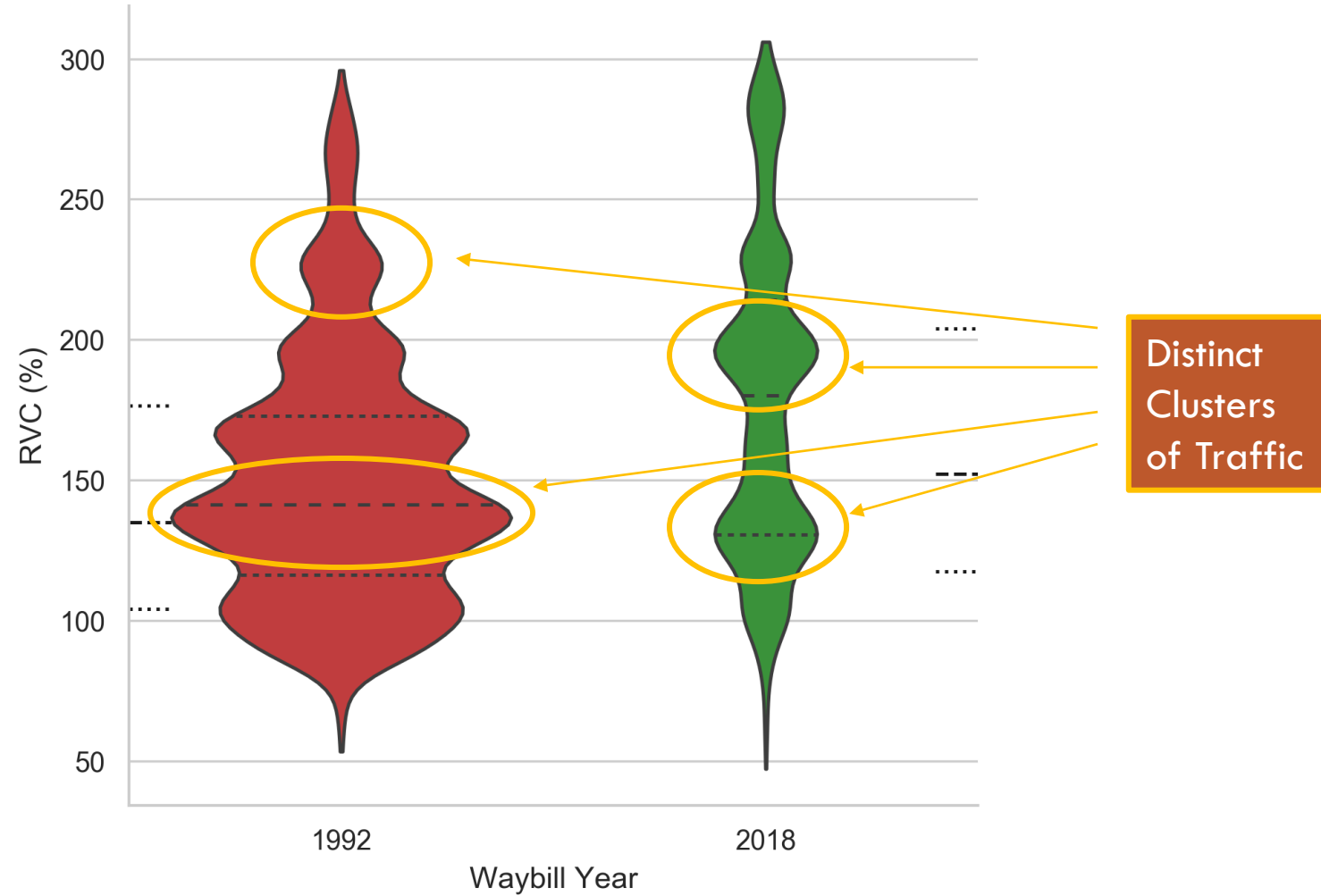
Kernel Density Estimation



Kernel Density Estimation

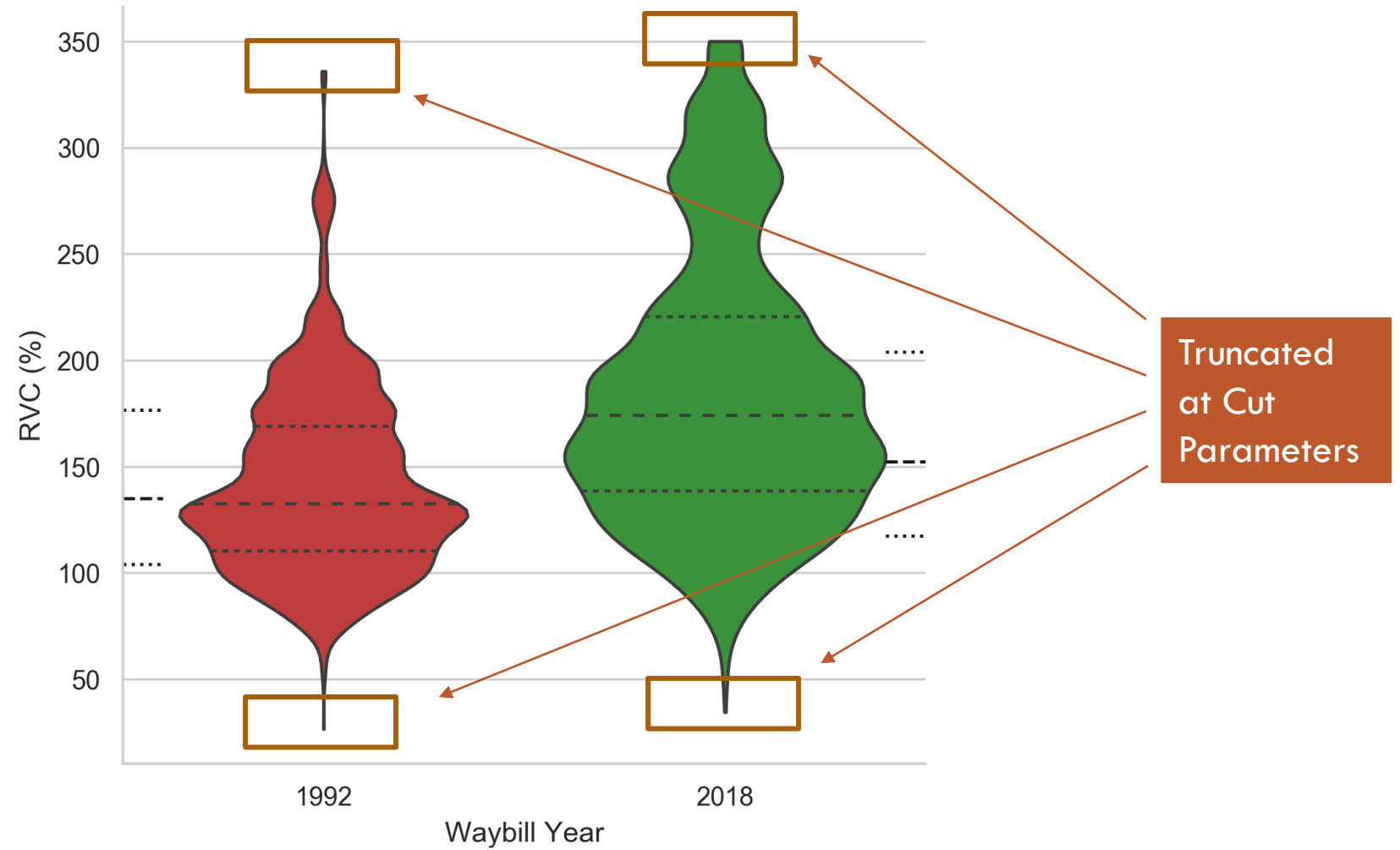


RVC Distribution for All Traffic by Waybill Year (STCC = 29914 Coke from Coal)



Item	1992	2018	Change
Avg. Haul Length (Mi.)	408.4	616.7	51.0%
No. of Waybills	2,592	433	-83.3%
Cars	199,400	69,426	-65.2%
Revenue	\$265,145,347	\$135,711,127	-48.8%

RVC Distribution for All Traffic by Waybill Year
(STCC = 32411 Hydraulic Cement)



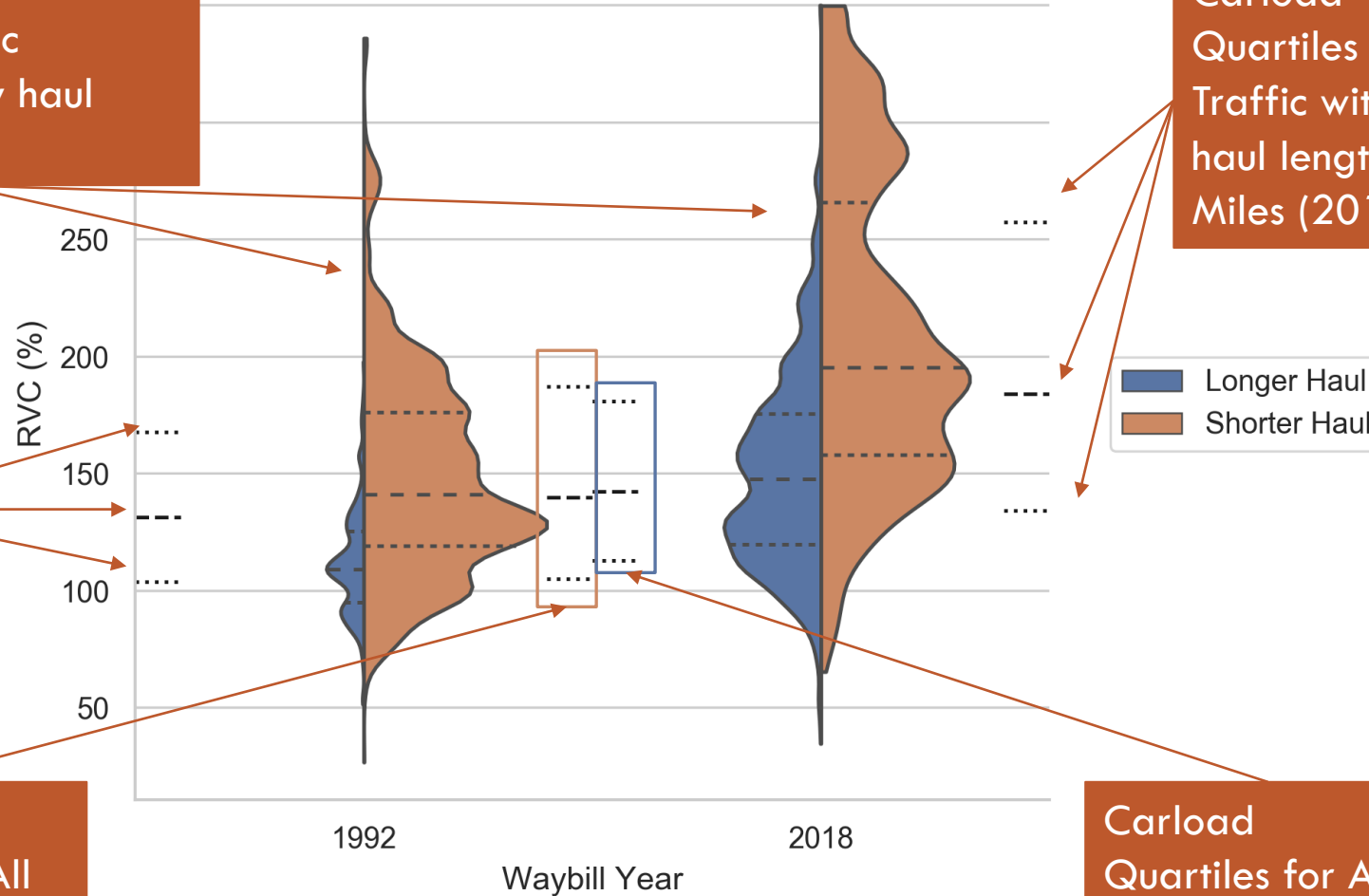
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RVC Distribution by Waybill Year Haul Length Comparison (500 mi.) (STCC = 32411 Hydraulic Cement)

All Hydraulic Cement
Carload Traffic
(segmented by haul
length)

Carload
Quartiles for All
Traffic with rail
haul length < 500
Miles (2018)

Carload
Quartiles for All
Traffic with rail
haul length > 500
Miles (1992)



Carload
Quartiles for All
Traffic with rail
haul length < 500
Miles (1992)

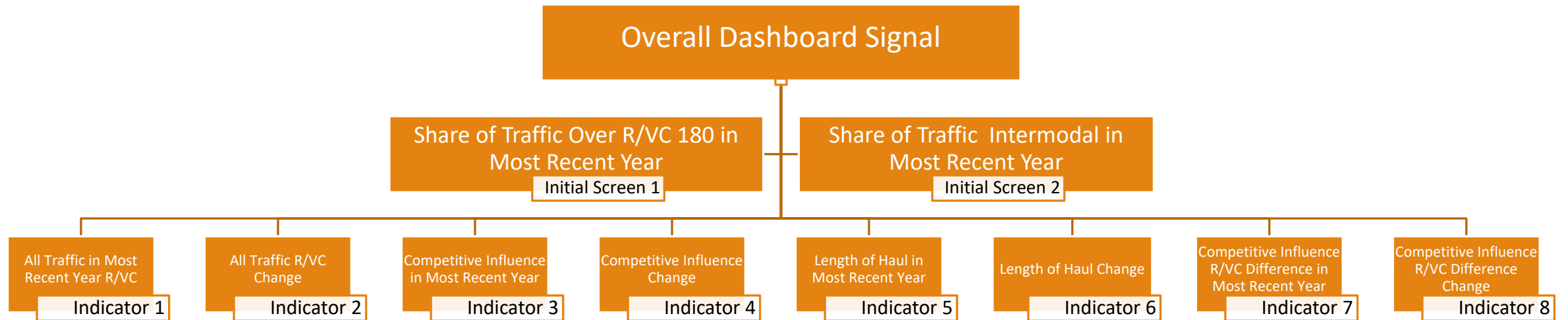
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Tools: Indicator Dashboard

Dashboard Components

- 2 Initial Screens
- 8 Indicators
- Overall Dashboard Signal



4 Indicator Dashboards

- Commodities to Consider for Exemption Revocation Using **R/VC Ratios**
- Commodities to Consider for Exemption Revocation Using **RPC Values**
- Commodities to Consider Adding to Exemption List Using **R/VC Ratios**
- Commodities to Consider Adding to Exemption List Using **RPC Values**

Any Questions?

Please use the Q&A function in Zoom to prompt our moderator with questions.