

This presentation premiered at WaterSmart Innovations

watersmartinnovations.com



Four Years of California Water Loss

Examining Validated Audit Submissions

Jessica Jagdeo and Kate Gasner

Water Systems Optimization

W S O



Background

CA SB-555 has required the yearly submission of validated water audits by Urban Retail Water Suppliers since 2017.

CA Department of Water Resources stores validated audits on their Water Use Efficiency platform.

These audits are becoming increasingly important in anticipation of the CA State Water Resources Control Board's publication of supplier-specific water loss performance standards.

Research Goals



```
graph LR; A[Research Goals] --- B[How has water loss performance in CA changed from 2016 to 2019 based on these audits?]; A --- C[Does water loss performance vary by CA region?]; A --- D[Does water loss performance vary by system size or other system characteristics?]; A --- E[How variable is water loss performance based on these audits?];
```

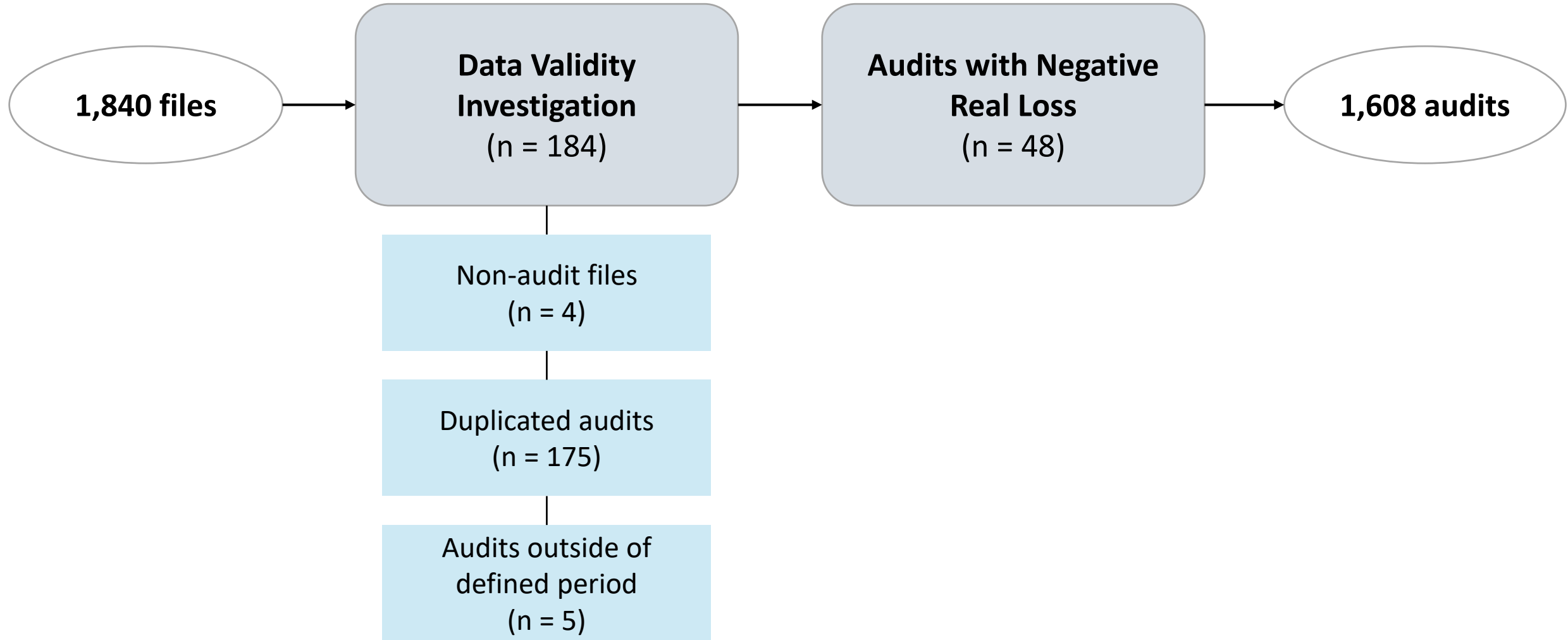
How has water loss performance in CA changed from 2016 to 2019 based on these audits?

Does water loss performance vary by CA region?

Does water loss performance vary by system size or other system characteristics?

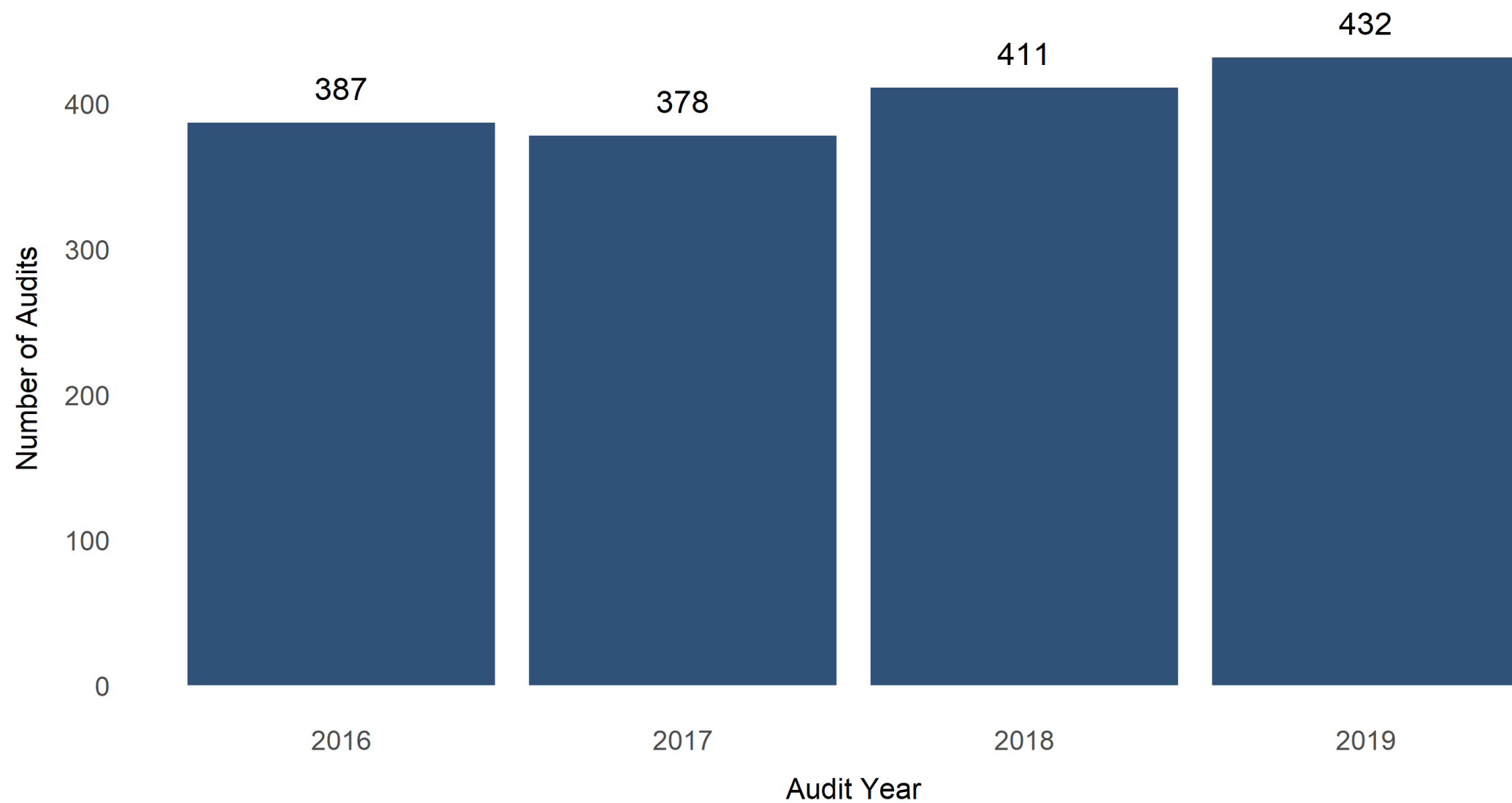
How variable is water loss performance based on these audits?

Methods

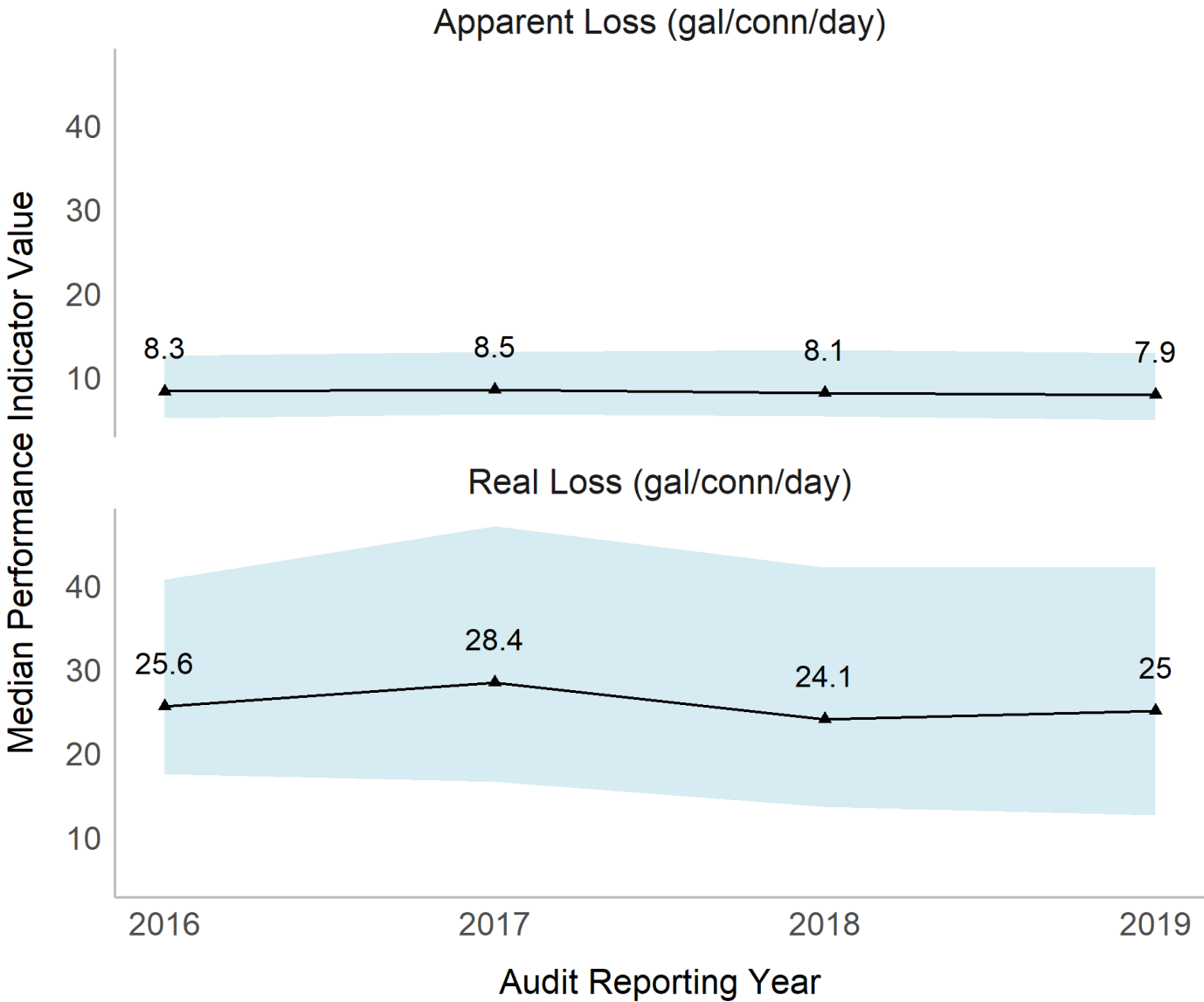


California Statewide Water Loss Performance

Count of Audits Submitted per Year (n = 1608)



California Statewide Historical Water Loss Performance



The black line displays **median** water loss.

The top of the shaded region displays the 75th percentile; the bottom displays the 25th percentile.

Apparent losses relatively stable.

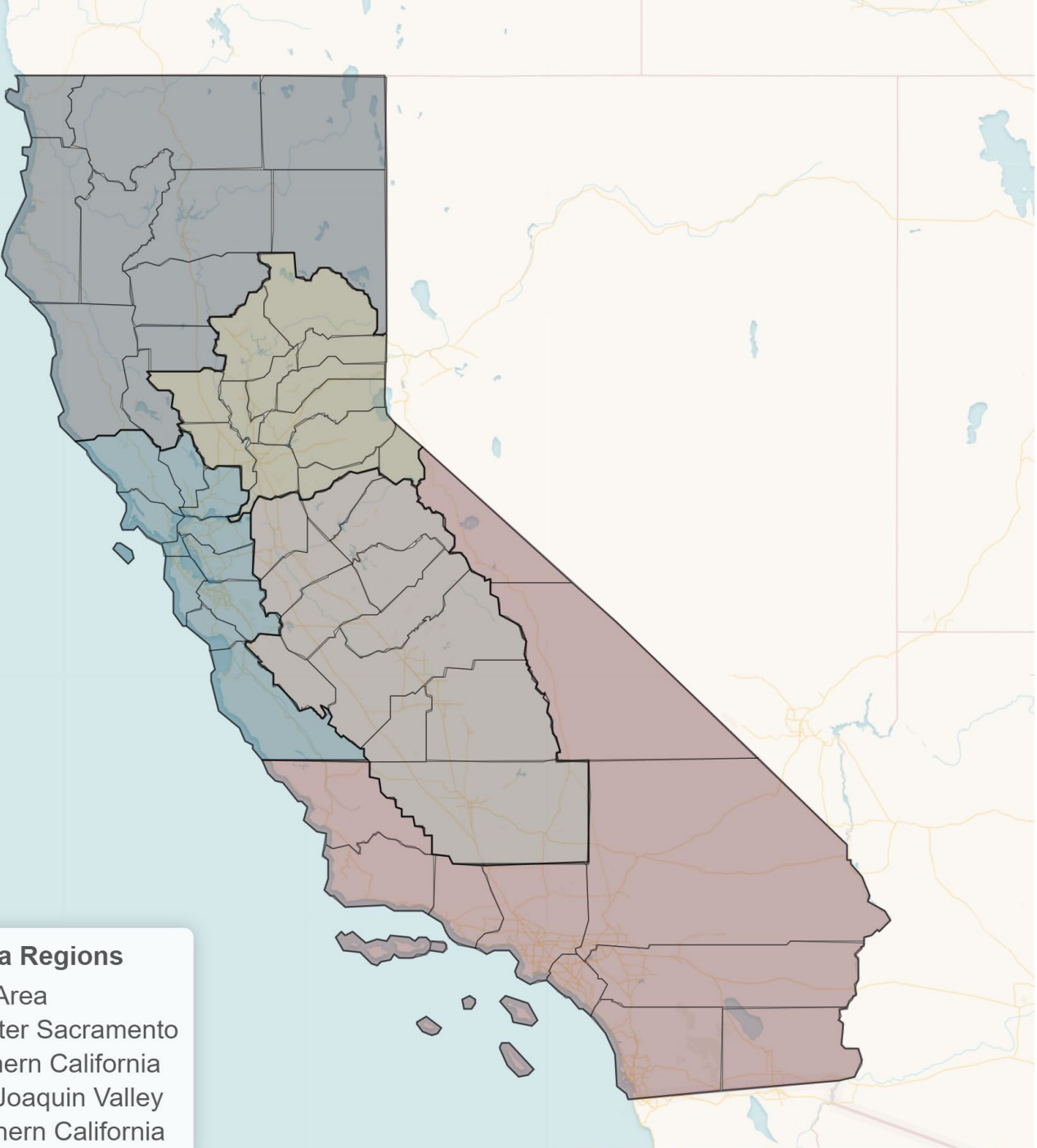
Increase in real losses in 2017 – otherwise, stable real losses.

California Regional Water Loss Performance



California Regions

- Bay Area
- Greater Sacramento
- Northern California
- San Joaquin Valley
- Southern California



Northern California: Del Norte, Glenn, Humboldt, Lake, Lassen, Mendocino, Modoc, Shasta, Siskiyou, Tehama, Trinity

Bay Area: Alameda, Contra Costa, Marin, Monterey, Napa, San Francisco, San Mateo, Santa Clara, Santa Cruz, Solano, Sonoma

Greater Sacramento: Alpine, Amador, Butte, Colusa, El Dorado, Nevada, Placer, Plumas, Sacramento, Sierra, Sutter, Yolo, Yuba

San Joaquin Valley: Calaveras, Fresno, Kern, Kings, Madera, Mariposa, Merced, San Benito, San Joaquin, Stanislaus, Tulare, Tuolumne

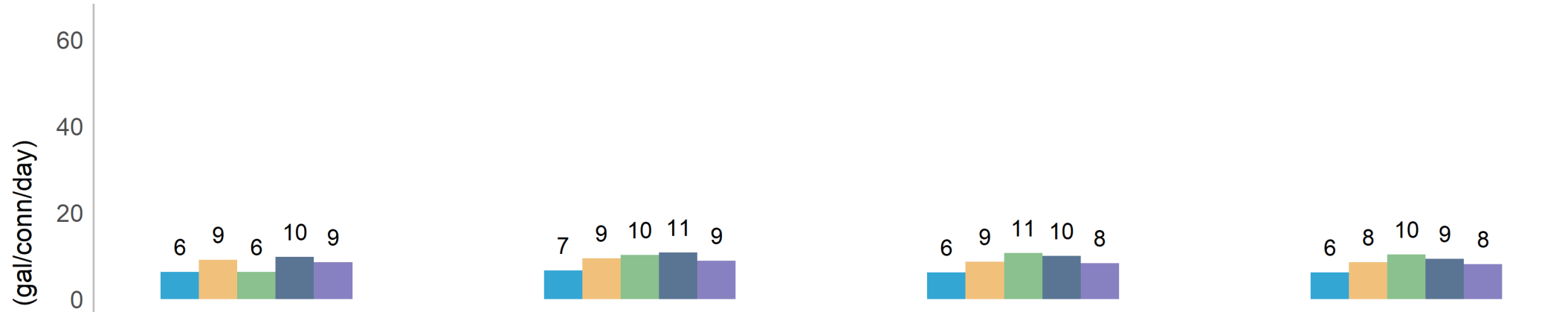
Southern California: Imperial, Inyo, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, Ventura

Count of Audits per CA Region

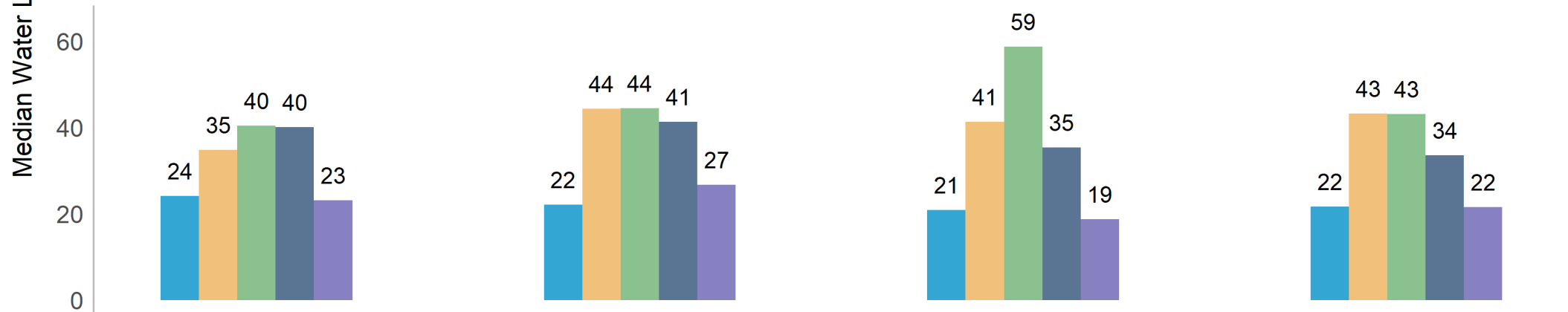
CA Region	2016	2017	2018	2019	Total
Bay Area	74	69	76	78	297
Greater Sacramento	39	42	49	64	194
Northern California	13	13	12	10	48
San Joaquin Valley	53	51	63	64	231
Southern California	208	203	211	216	838

California Regional Historical Water Loss

Apparent Loss (gal/conn/day)



Real Loss (gal/conn/day)



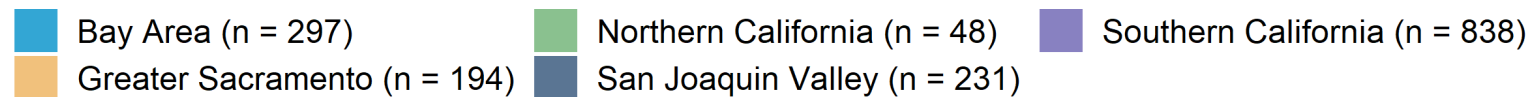
2016

2017

2018

2019

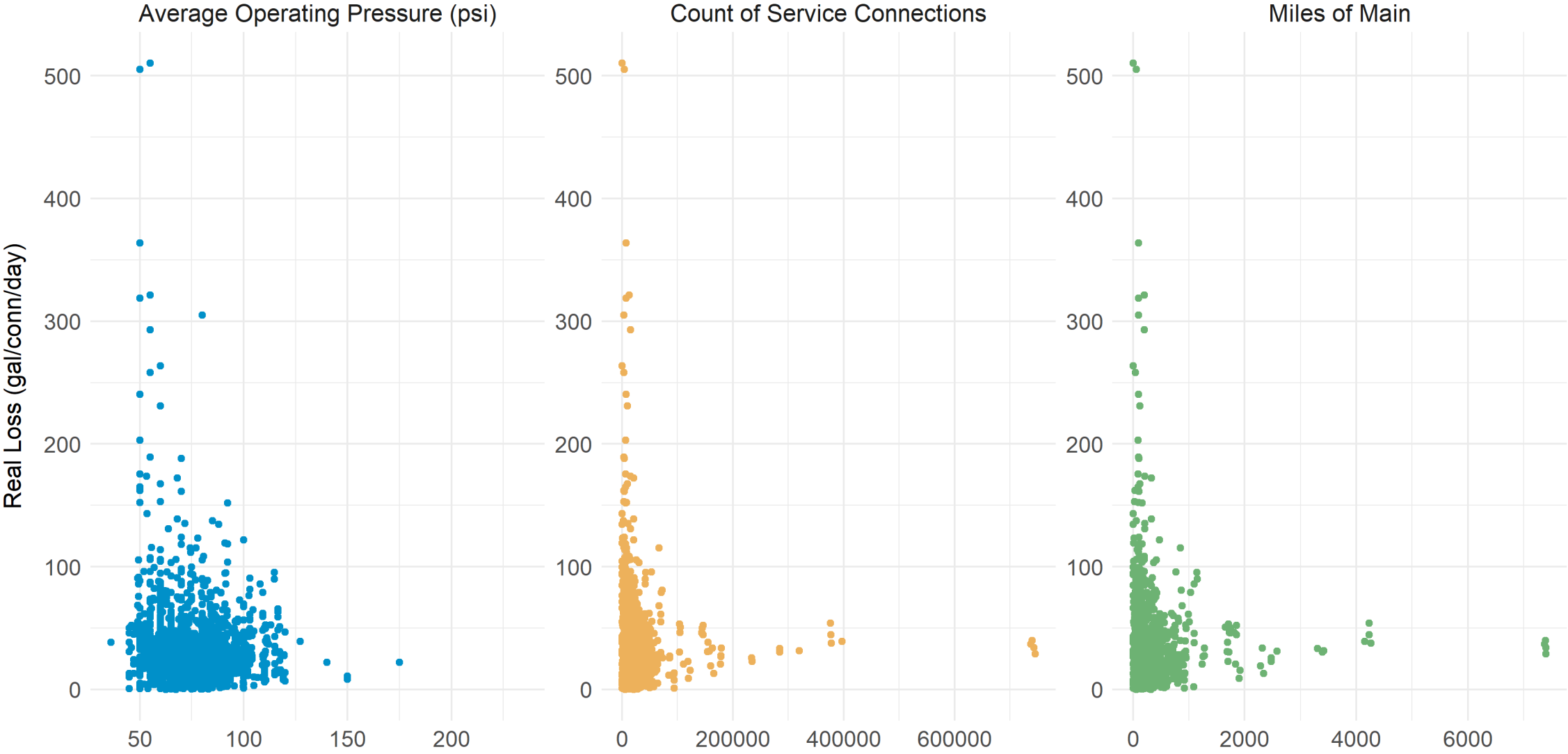
Audit Reporting Year



System Characteristics & Water Loss Performance

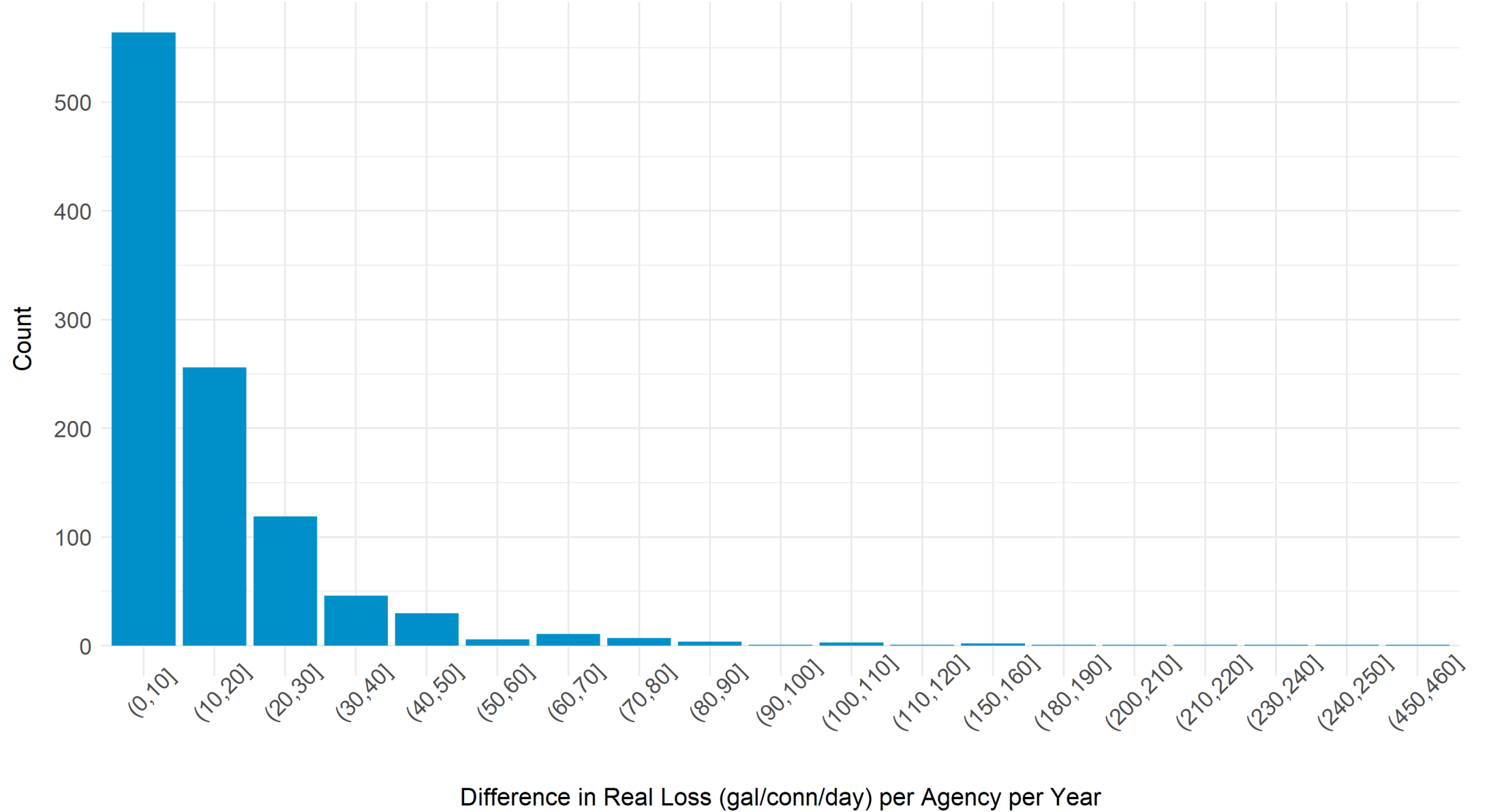
System Characteristic	Minimum	Median	Maximum
Length of Mains (miles)	0.5	169	7,400
Count of Service Connections	1	10,733	745,489
Average Operating Pressure (psi)	36	74	235

Comparison of System Characteristics and Real Losses
2016-2019



Agency-Level Variability in Real Losses

Variability in Real Losses at the Agency Level 2016-2019



Takeaways

- Recent estimates of median real loss are ~25 gal/conn/day.
- Greater Sacramento and Northern California have larger estimates of historical median real loss than Southern California and the Bay Area.
- No discernible pattern in historical real loss based on system characteristics.
- There is wide variability in real losses per agency from year to year, which should be considered in relation to the CA SWRCB's water loss performance targets.

Additional Considerations

- How certain are we that the audit data accurately reflects CA water loss performance?
- Can we expand this type of analysis outside of California?

Thank You!



Jessica Jagdeo

jessica.jagdeo@wsoglobal.com



Kate Gasner

kate.gasner@wsoglobal.com