

Evaluating Publication Rules for the County Agricultural Production Survey Using Simulation

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Disclaimer

- The findings and conclusions in this presentation are those of the author and should not be construed to represent any official USDA or U.S. Government determination or policy.

County Agricultural Production Survey

- Annual Survey
 - Small Grains
 - Row Crops
- Publication of county level estimates of planted and harvested acreage – yield and production
- 2019 and earlier publication rule:
 - 30 reports
 - OR
 - 3+ reports AND $\geq 25\%$ coverage.

Goals/Objectives

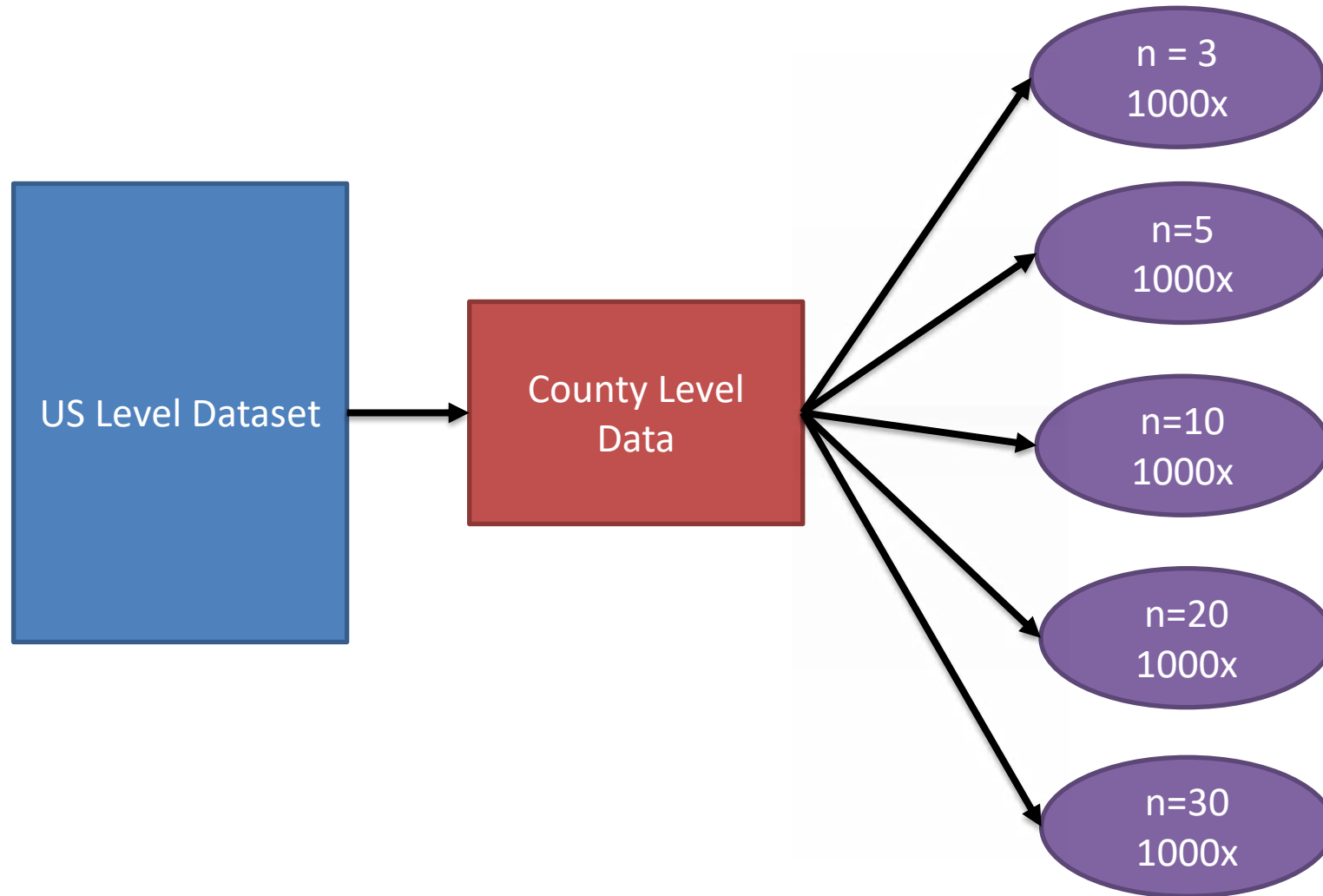
- Publish accurate estimates
- Publish as much as possible



Administrative Data

- USDA program
- Excellent Coverage
- For this simulation, treating as the population.

Monte Carlo Simulation

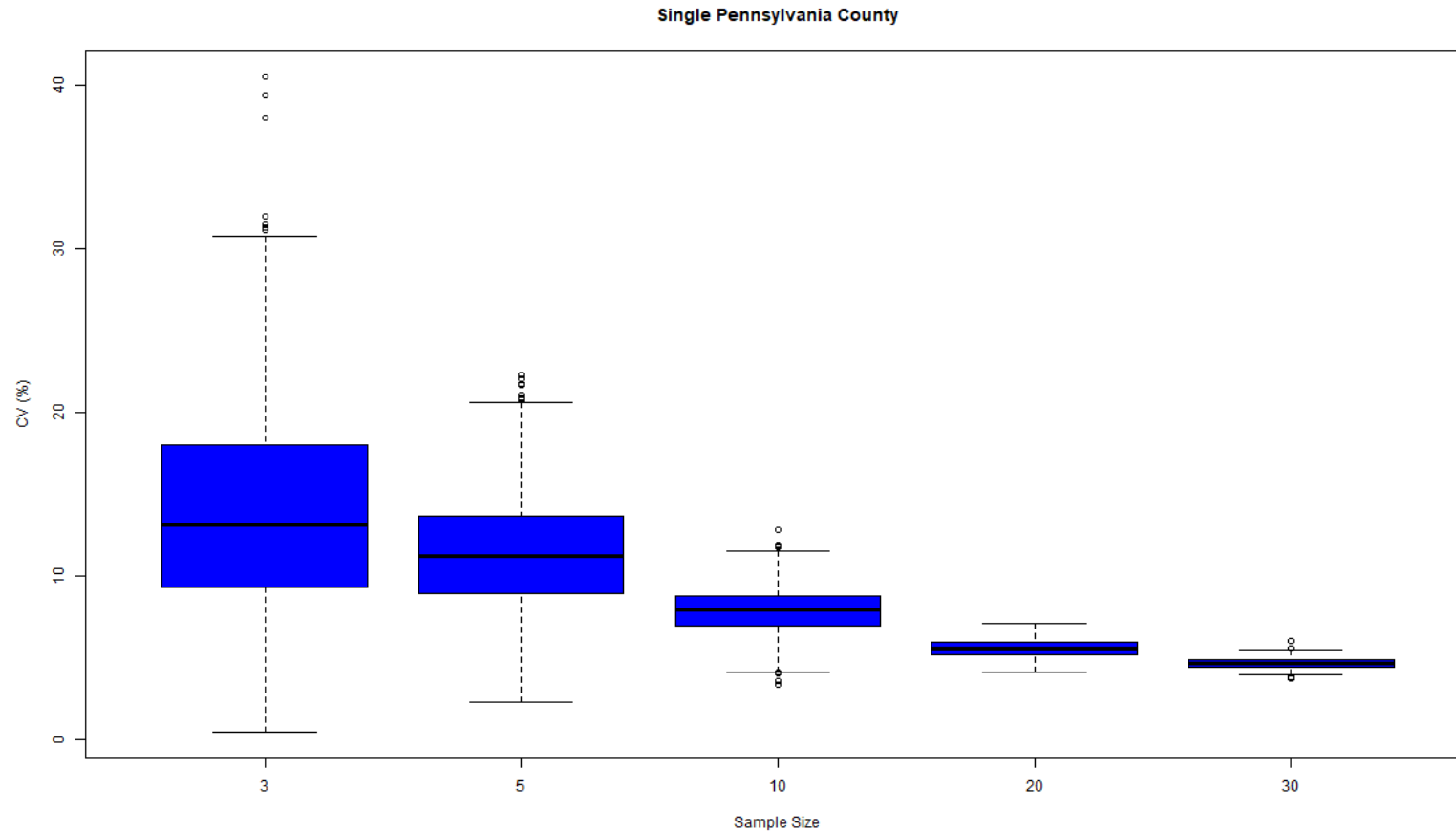


Simulation Design

- Probability Proportionate to Size (PPS)
- Weighted Yield (Ratio Production/Acres)
- Variance Estimated
- Coefficient of Variation Calculated

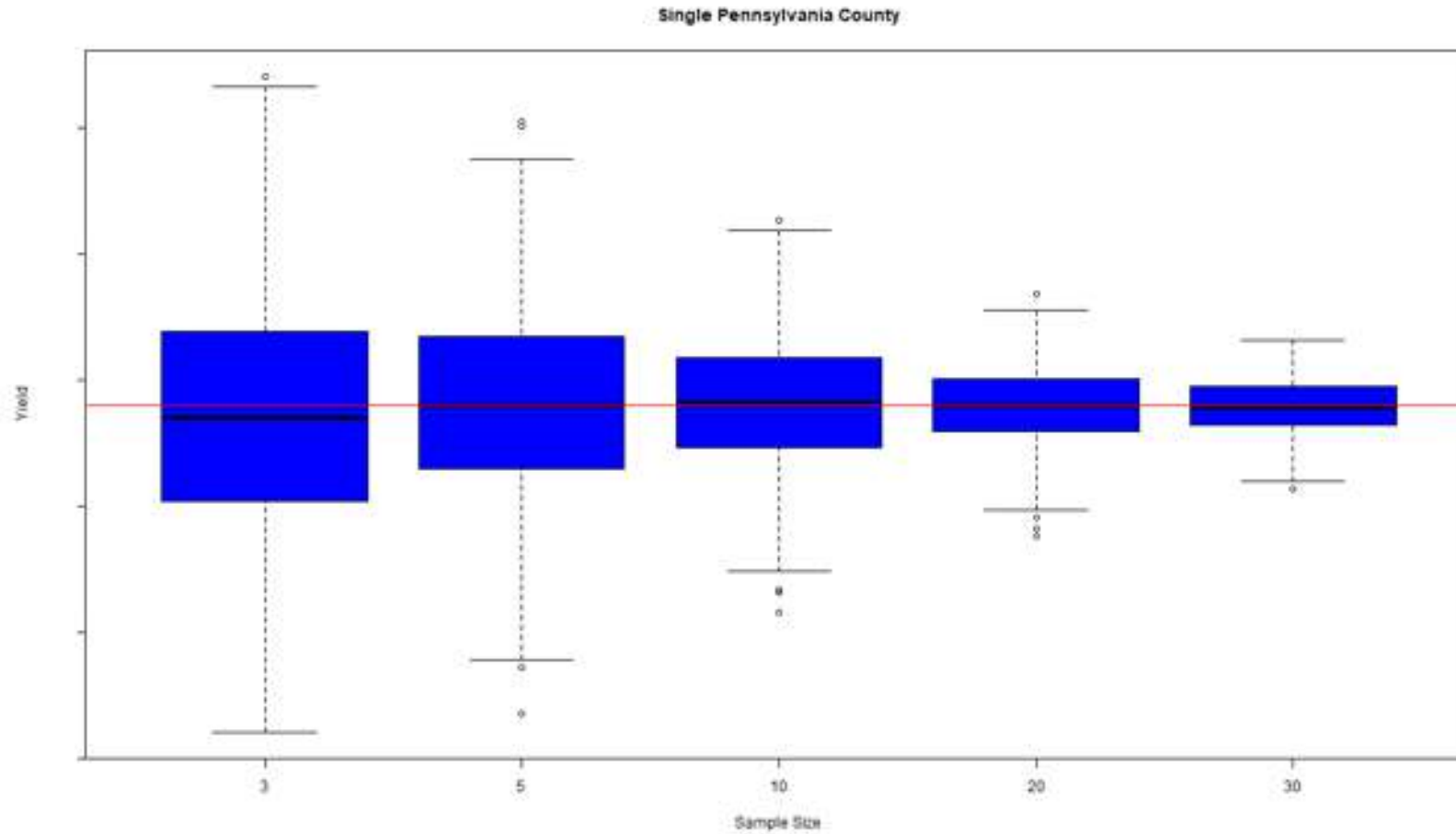
Pennsylvania County Example

Coefficient of Variation (CV)



Pennsylvania County Example

Yield

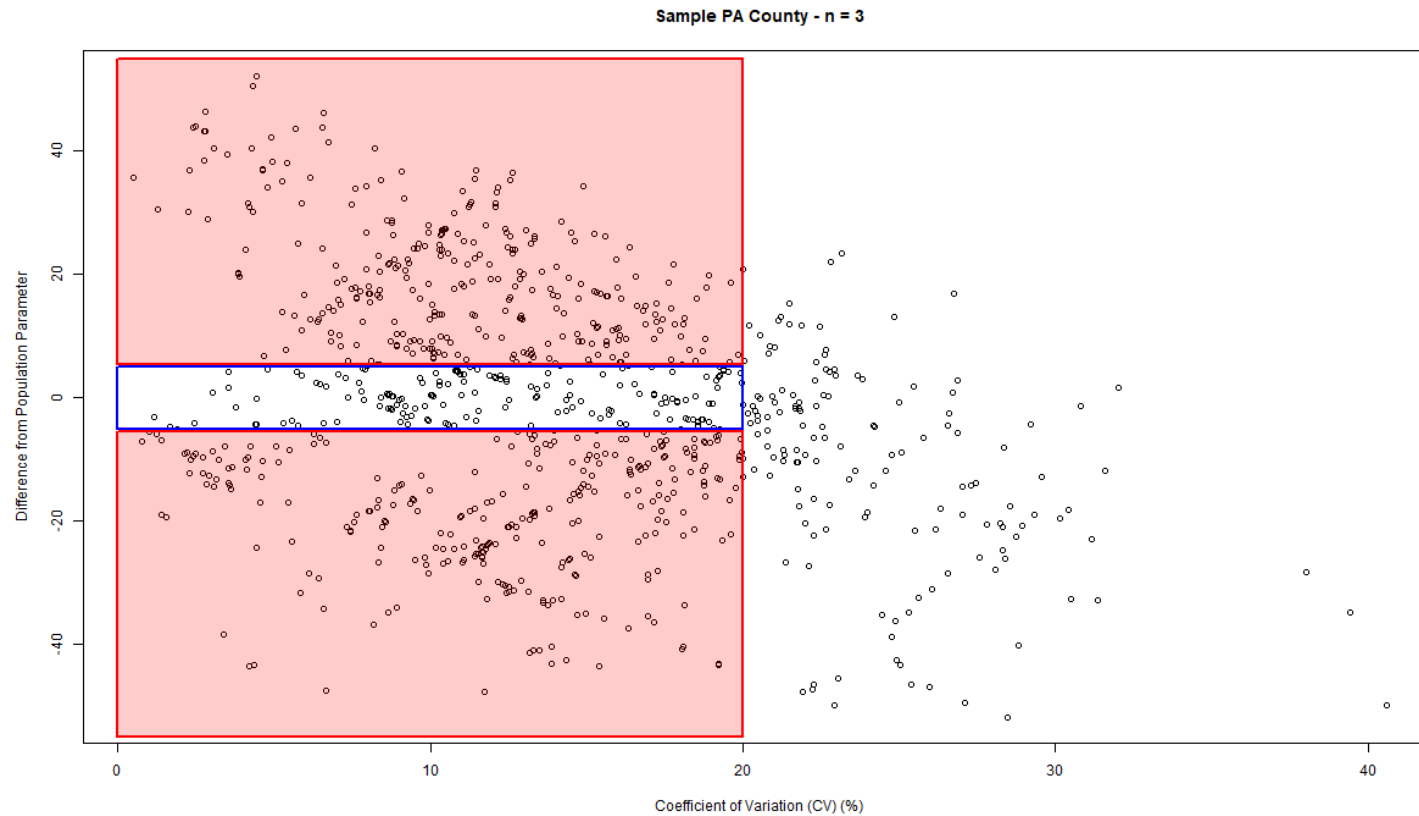


Low CV & Far From Truth

- What is a “low” CV?
 - For this example, we will use 20%
- What is “far” from population parameter?
 - For this example, we will use 5 bushels/acre

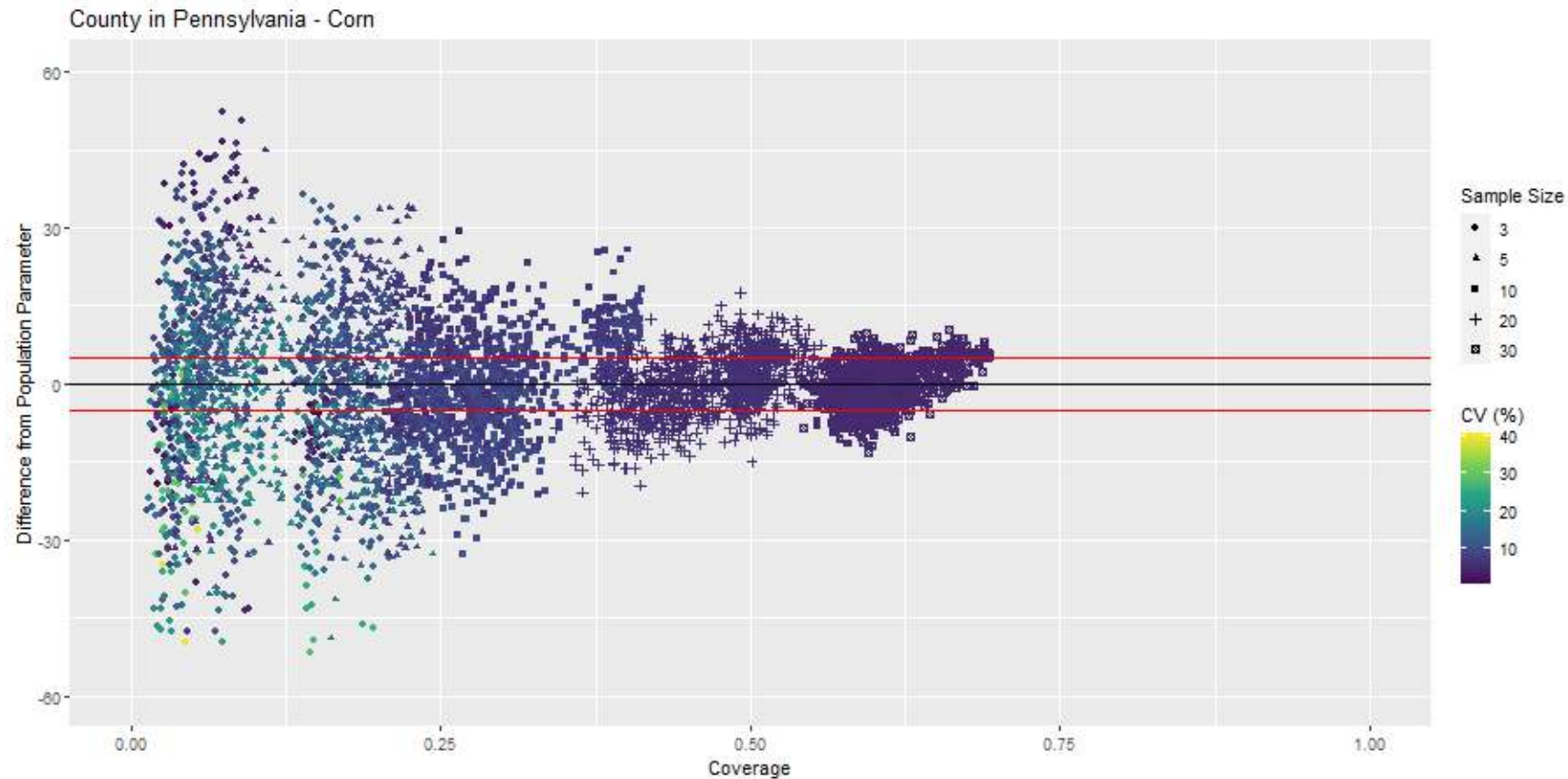
Pennsylvania County Example

n=3



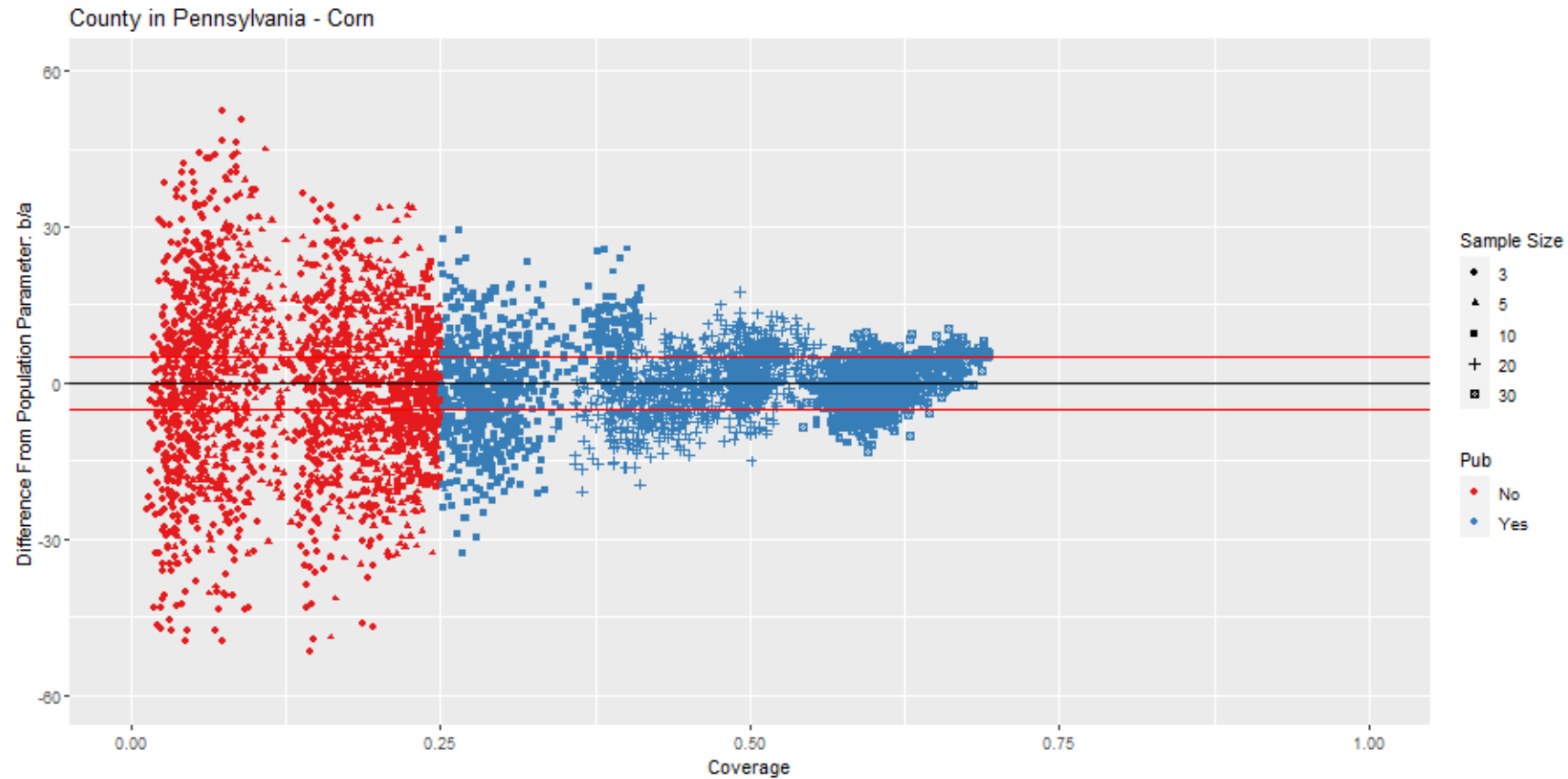
Pennsylvania County Example

difference, coverage, cv, and sample size



Pennsylvania County Example

Old Publication Rule

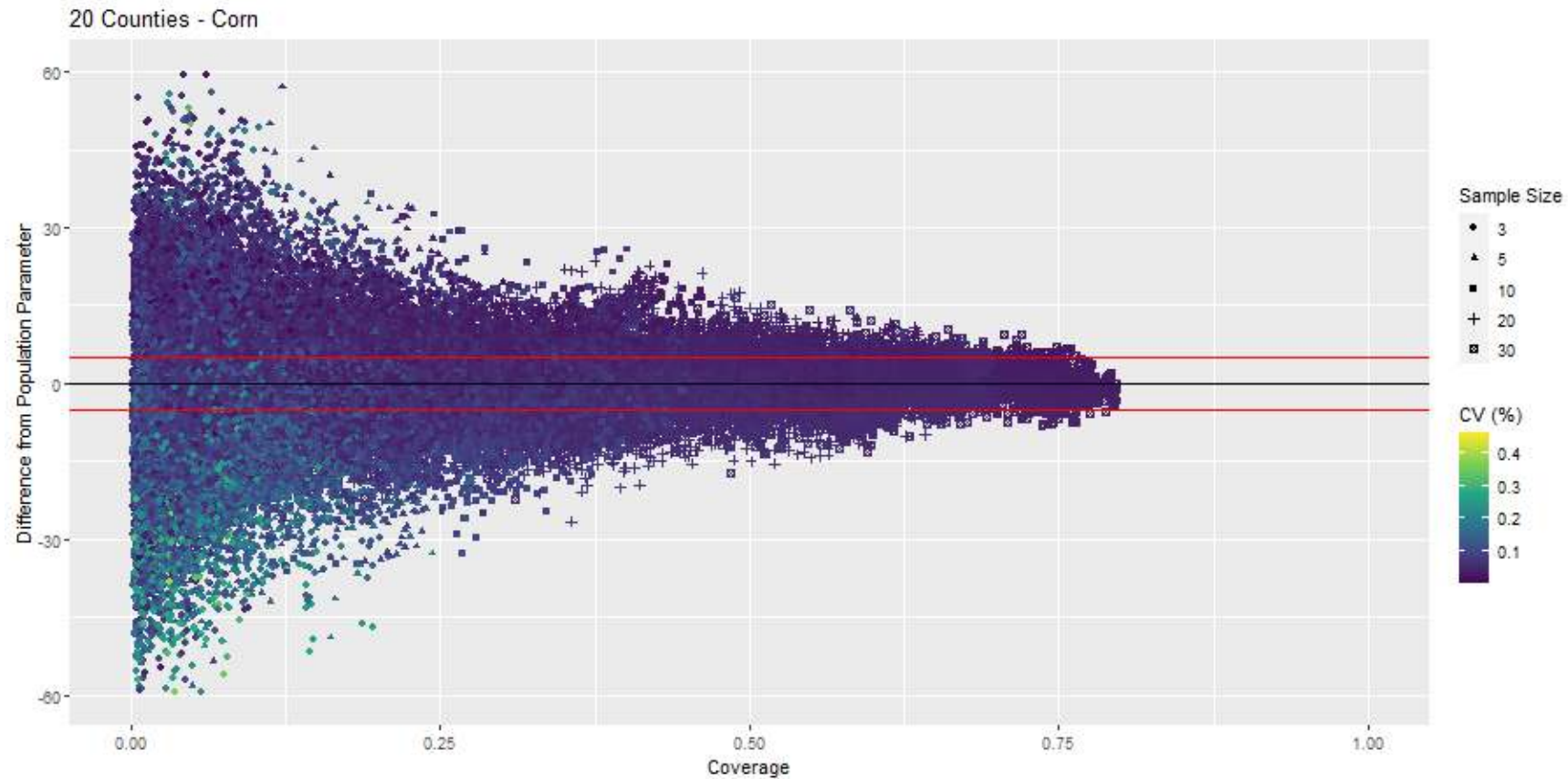


Expanding

- For visualization purposes
 - 20 random counties
 - 10 different states

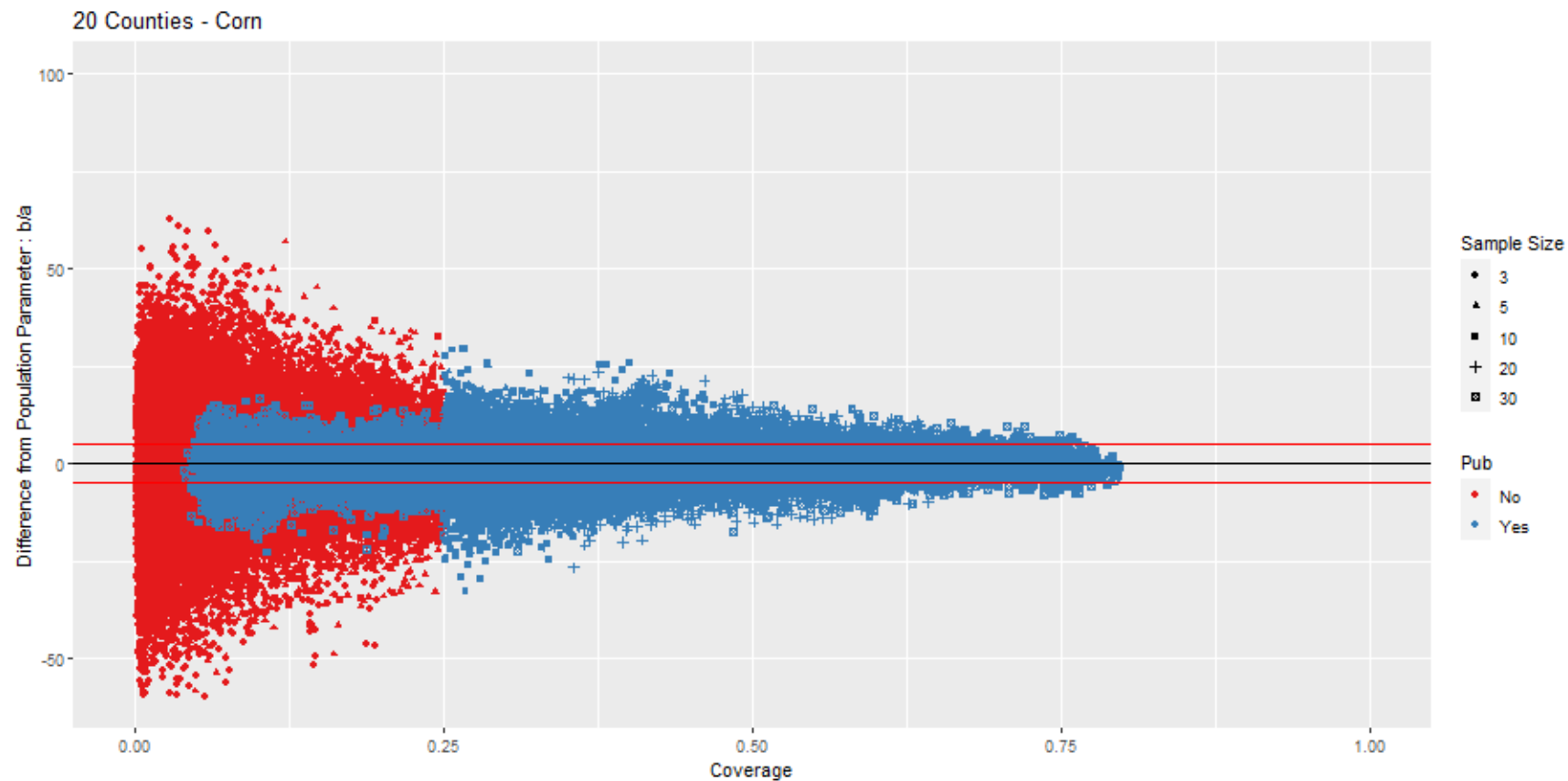
20 Counties

Difference, Coverage, CV, and Sample size



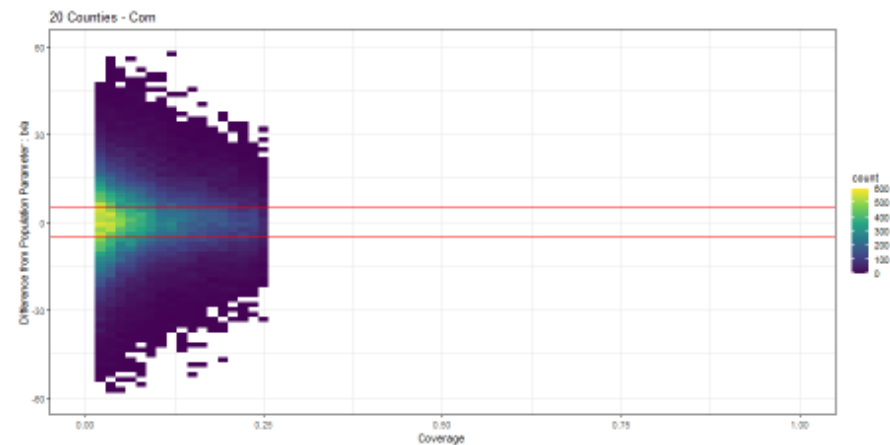
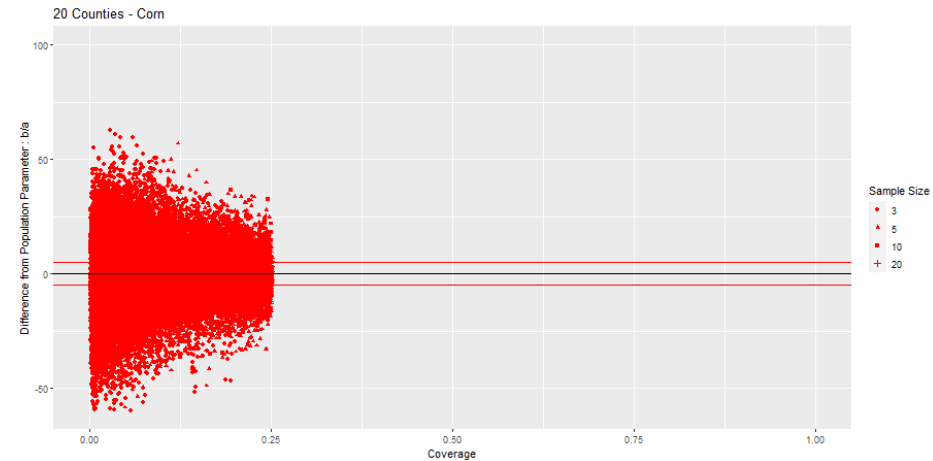
20 Counties

Old Publication Standard



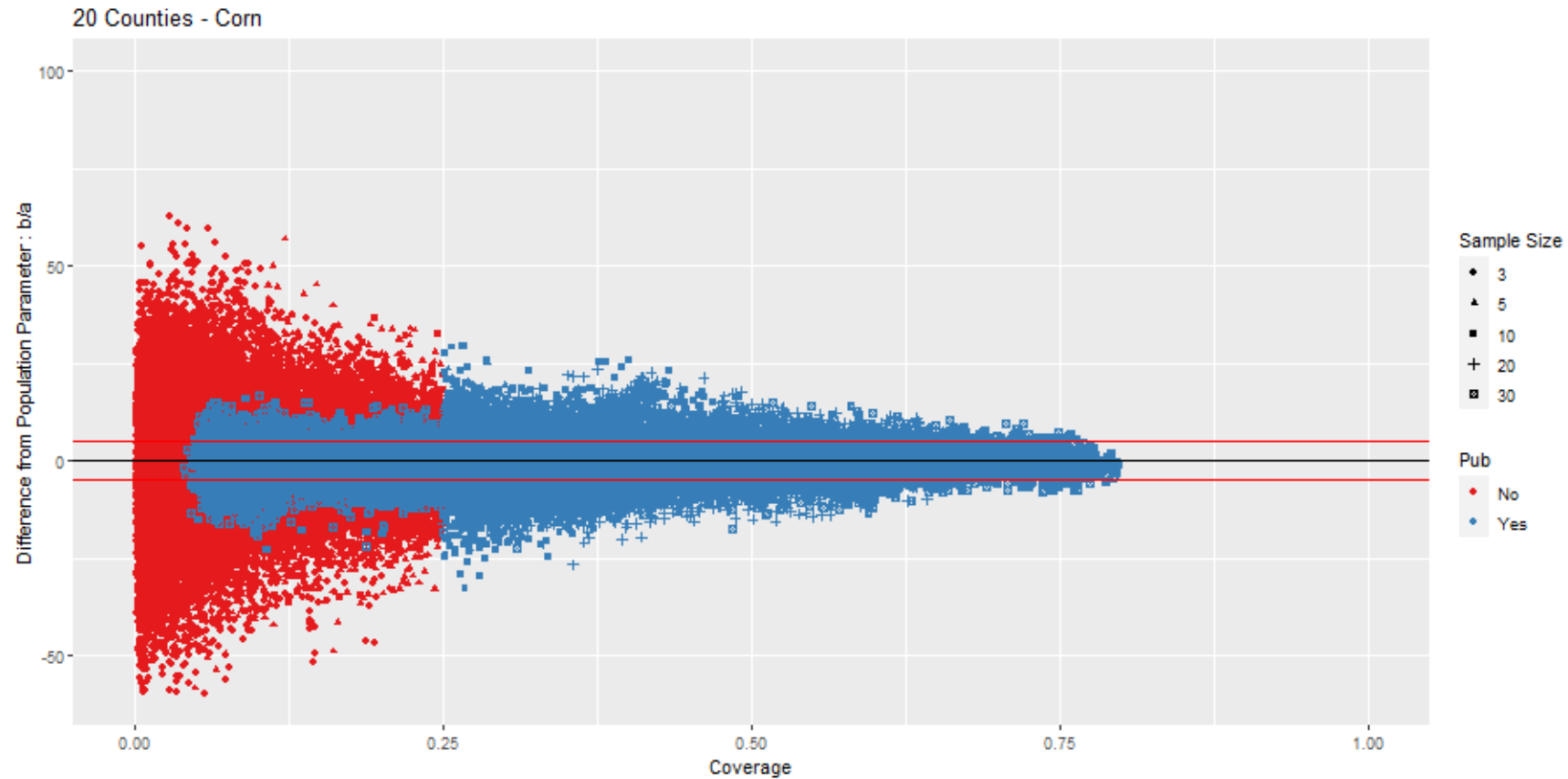
20 Counties

Old Publication Standard – Not Published



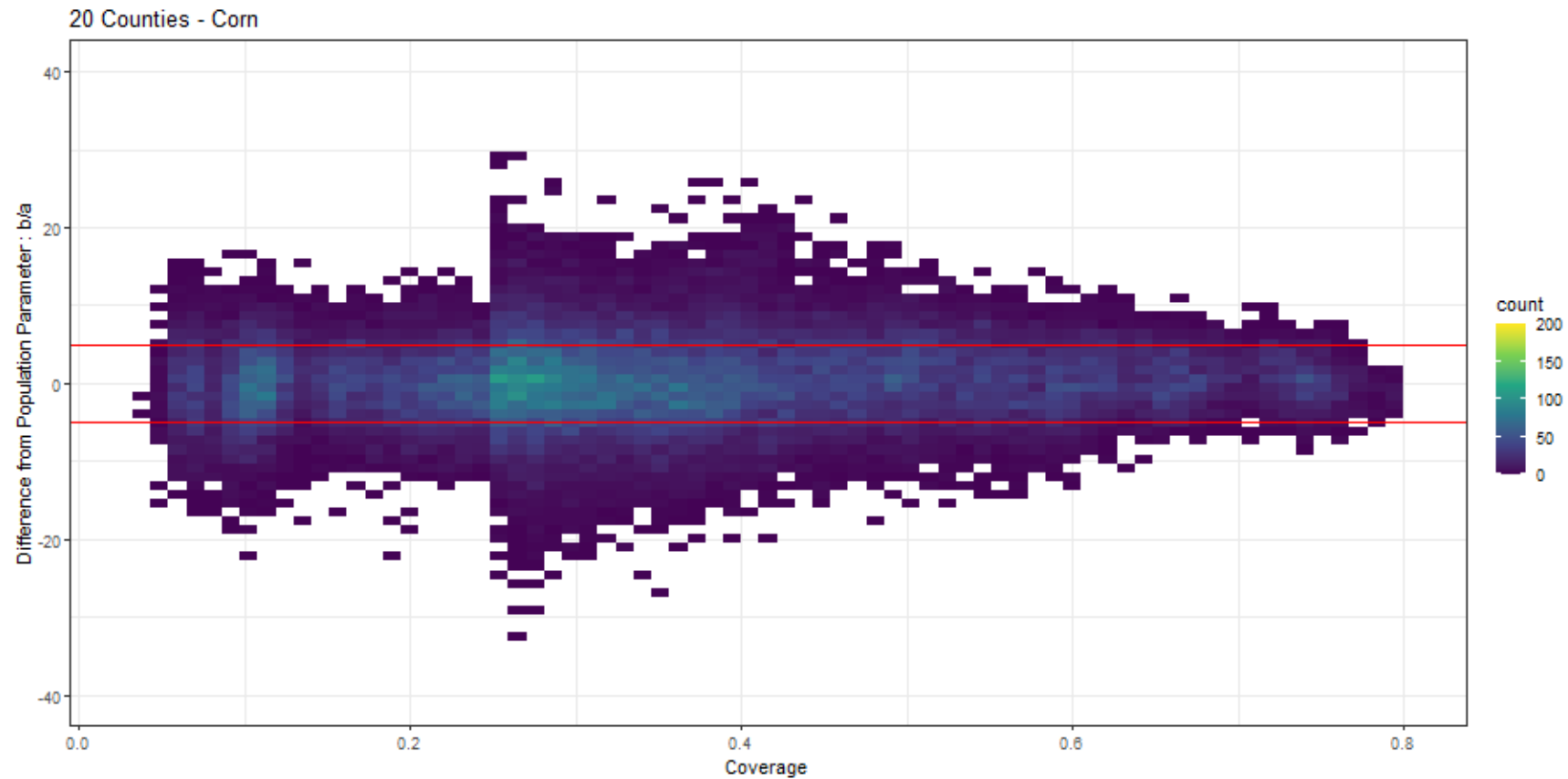
20 Counties

old publication standard



20 Counties

Old Publication Standard = “Yes”

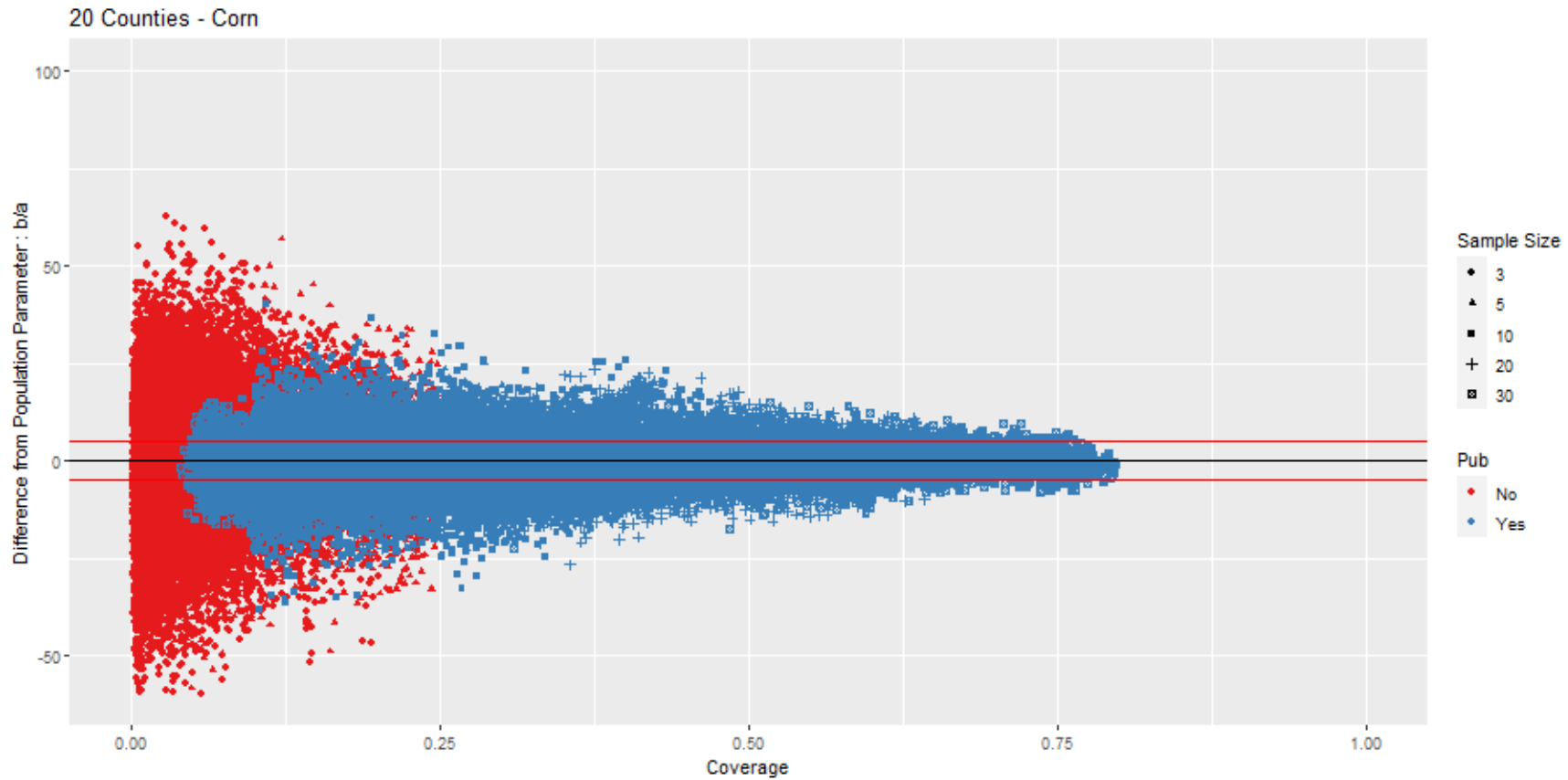


A new standard

- 30 reports
OR
- 3 reports and 25% coverage
OR
- 10 reports and 10% coverage ***new***

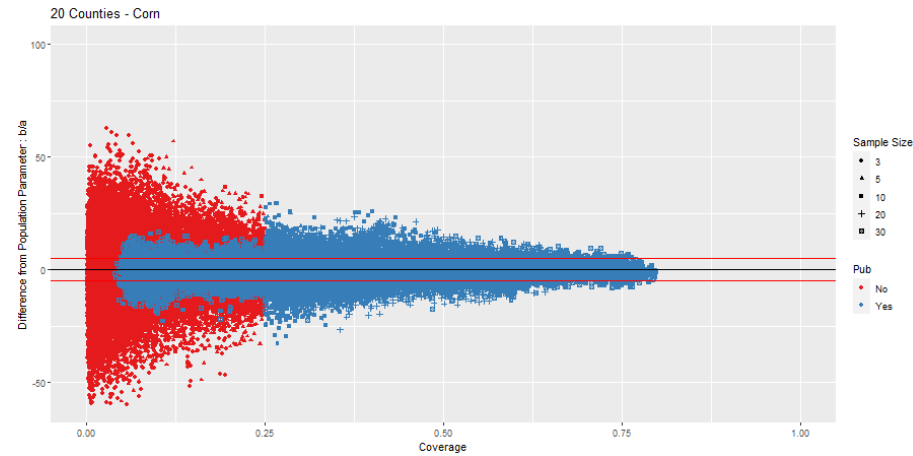
20 Counties

New Publication Standard

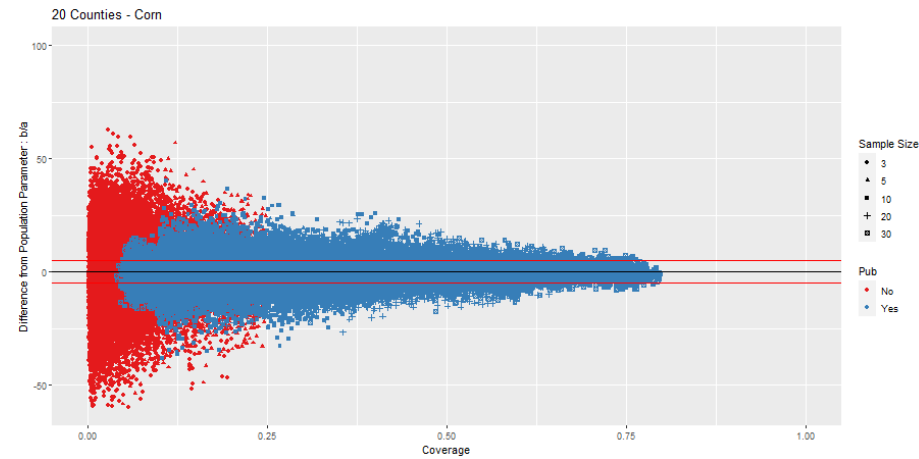


Old vs New

Old
Publication
Standard

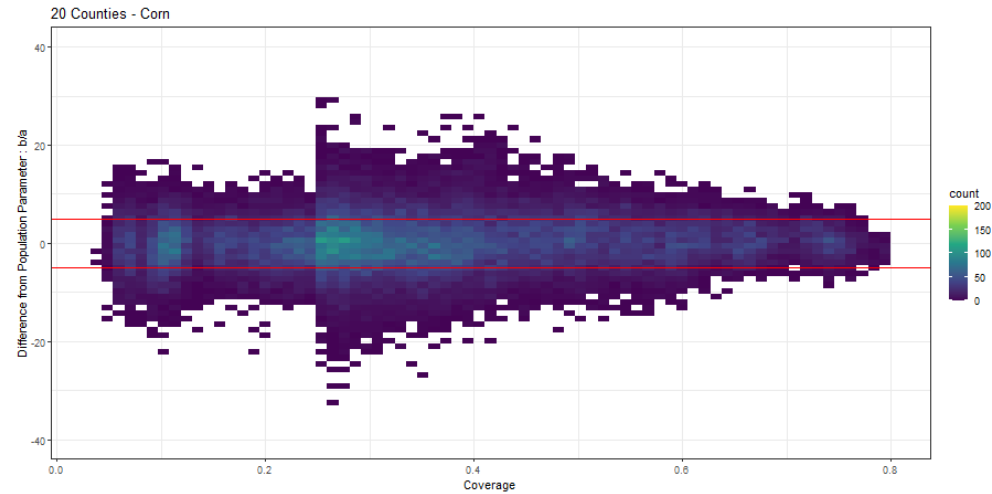


New
Publication
Standard

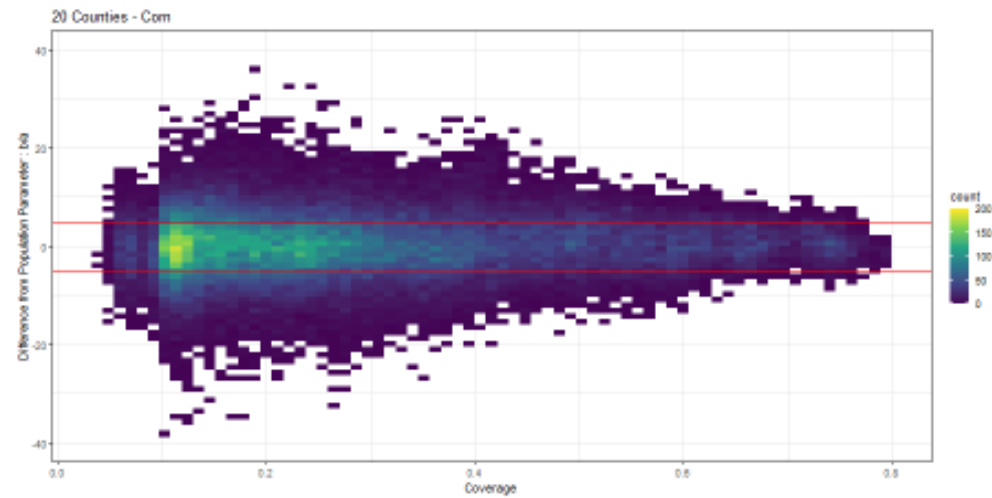


Old vs New

Old
Publication
Standard

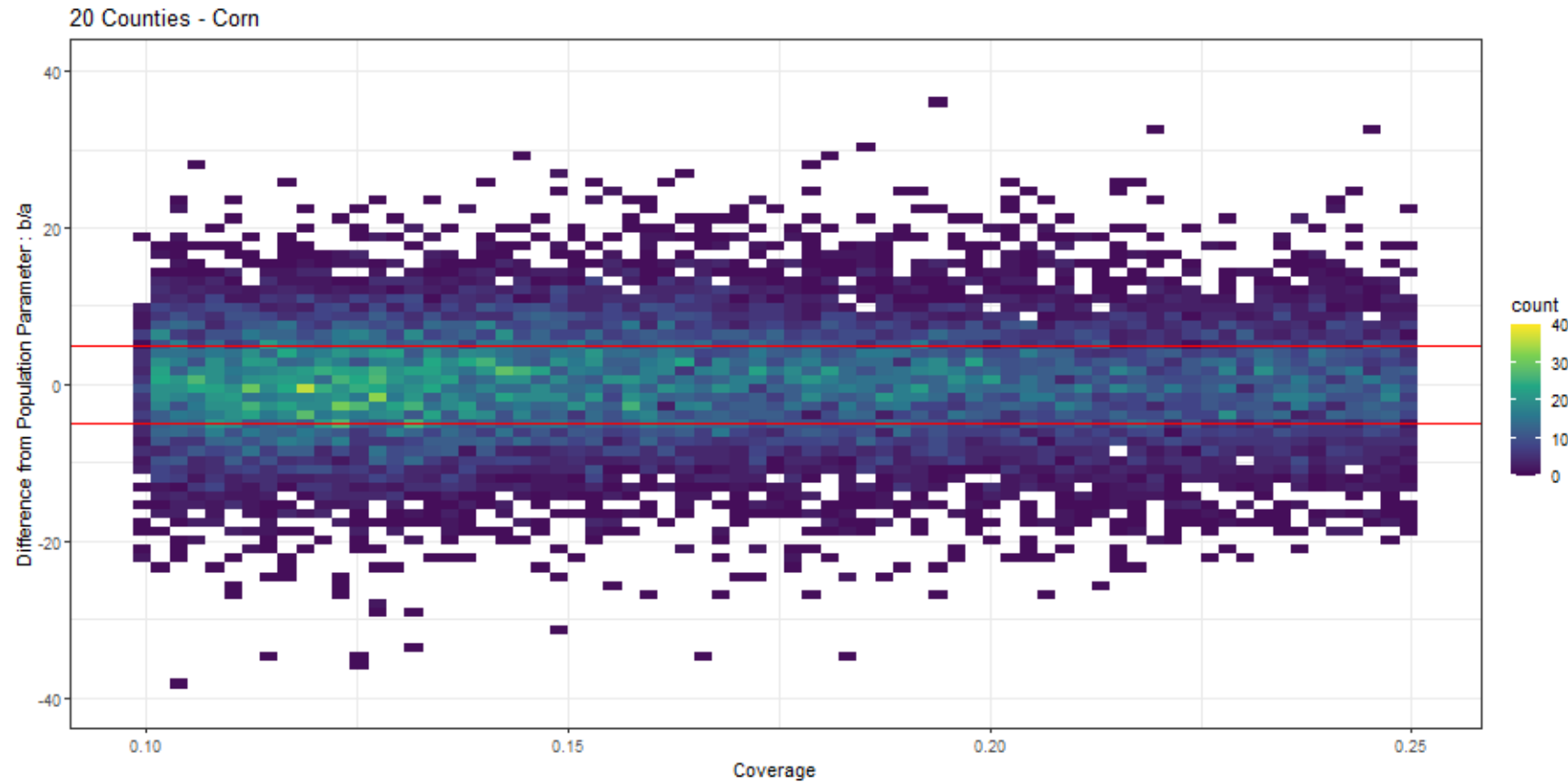


New
Publication
Standard



New Publication Standard

Simulation estimates published under new standard, but not old



Summary

Pub Rule	Total Simulations	Number Published	Number Published With Greater than 5 Bushels/Acre from Population	Good Pub Rate (% published within 5 bushels/acre of Population)	Absolute Average Difference from Population bushels/acre
Old Rule	100,000	30,869	9,458	0.69	4.09
Proposed Rule	100,000	46,583	16,453	0.65	4.57
CV < 20%	100,000	98,268	50,313	0.49	12.02

Additional Factors

- County Agricultural Production Survey modeled indications
 - Cruze et al (Statistical Science 2019 vol 34)
 - Strength added to yield indication from National Commodity Crop Productivity Index (NCCPI) and location
- Additional References
 - Bell and Barboza (2012) ICES proceedings
 - Cruze et al (2018) JSM proceedings
 - Cruze and Young (2019) JSM proceedings
 - National Academies Report (2017)

Conclusion

- One size fits all is difficult
- Simulation allows for a variety of different rules to be explored.