Post-Election Audit Efforts in Iowa

Successes and Challenges

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Survey Workgroup
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Outline

Background

Iowa Legislation

Methodologies

Horizon

ASA Policy

- 2008 ASA Board of Directors endorsements
- March position on electoral integrity

  It is critical that the integrity of central vote tabulations be confirmed by audits of voter-verified hard-copy records in order to provide high – and clearly specified – levels of confidence in electoral outcomes.

- September endorsement of election auditing principles

Transparency

- Ohio Joint Audit Working Group definition

  Transparency entails that the public should have the opportunity to observe the audit and to ensure that all phases have been conducted correctly. . . Everyone should understand what the procedure requires and why, with little room or need for subjective interpretation during the audit.

- How is this interpreted?

Audit Terminology

- True result is a full hand recount
- Risk-limiting audits reduce the risk of confirming an incorrect outcome
- Risk - probability of certifying a result different than what a full recount would reveal
- Methodologies vary in their efficiency

IA Bill

- HF682 introduced in 2009
- Based on a Minnesota law implemented in 2008
- Passed House 98-0 on March 24, 2009
- Did not leave Senate State Government Committee
- Plans to introduce in 2010

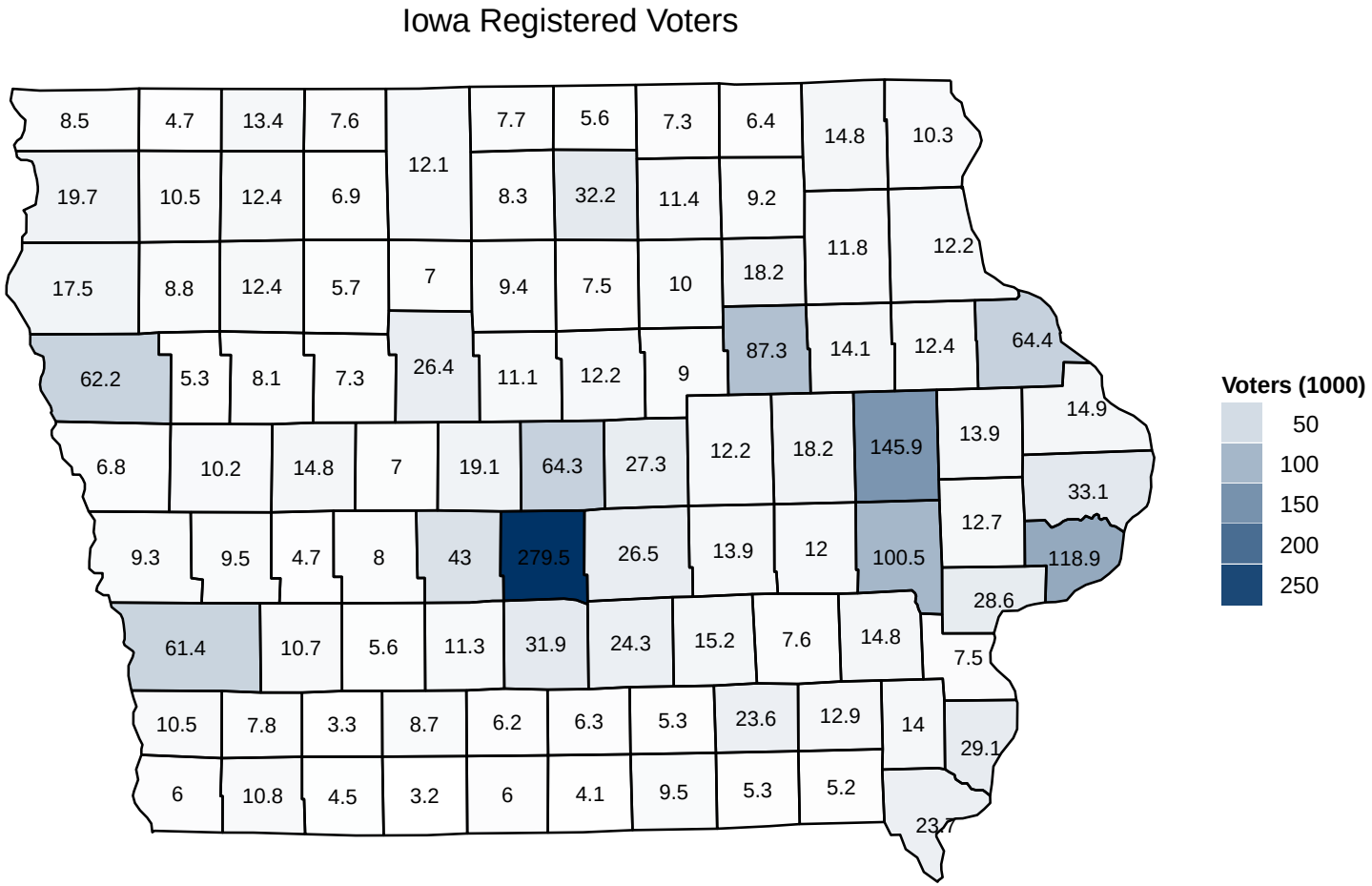
A Look at HF682

- Counties select precincts for audit by lot
- "Tiered" audit protocol
  - One precinct if county has 7 or fewer precincts
  - Two precincts if county has 50,000 or fewer registered voters
  - Three precincts if county has 50,001-100,000 registered voters
  - Four precincts if county has over 100,000 registered voters
- President and governor always audited
- One additional race randomly selected

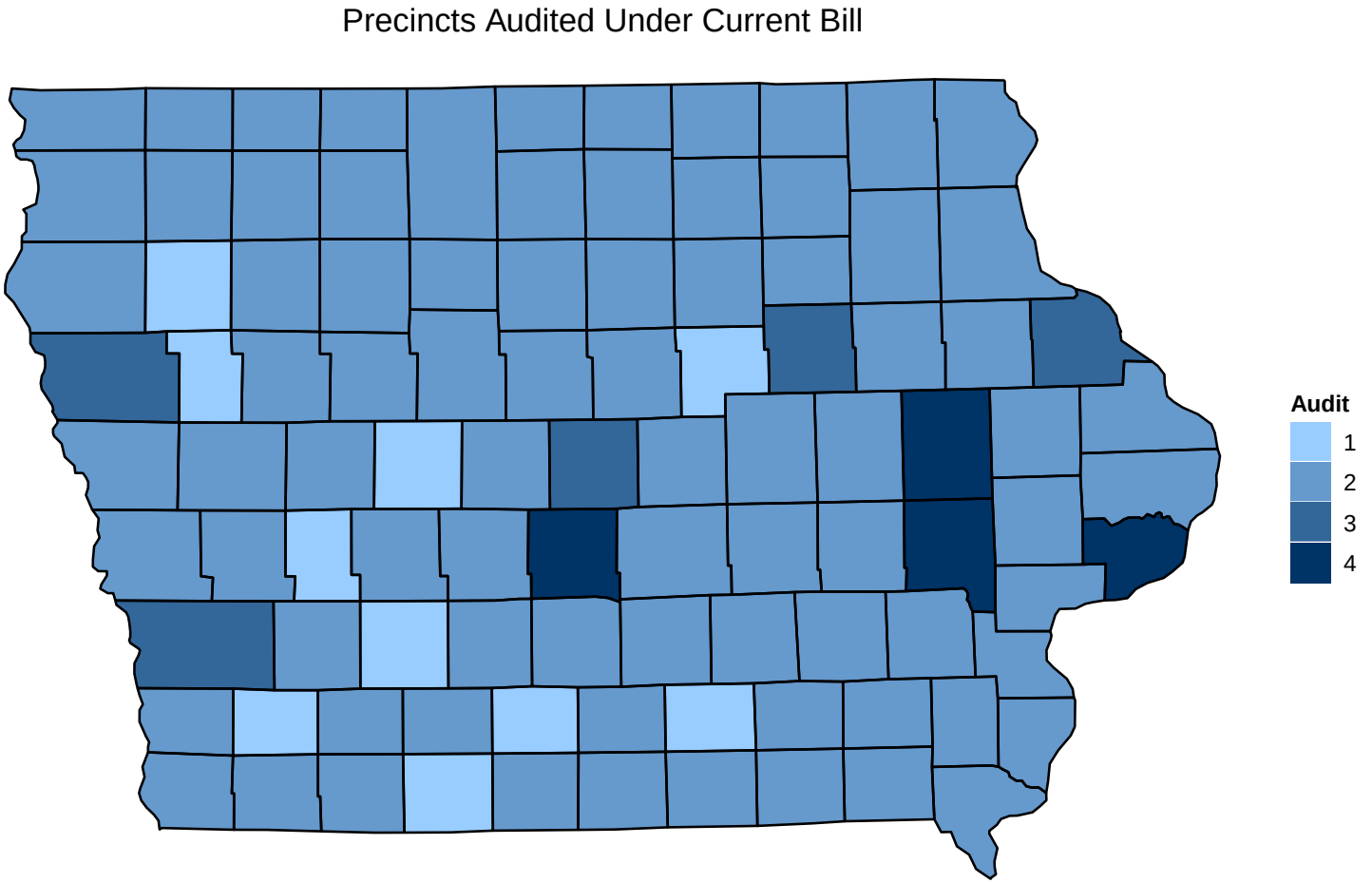
A Look at HF682

- No computerized randomization
- Escalation mandated when hand count reveals a discrepancy of at least 0.5%
- Additional two precincts selected in second round
- State commissioner of elections may mandate further escalation
- Precinct requirements are minimums

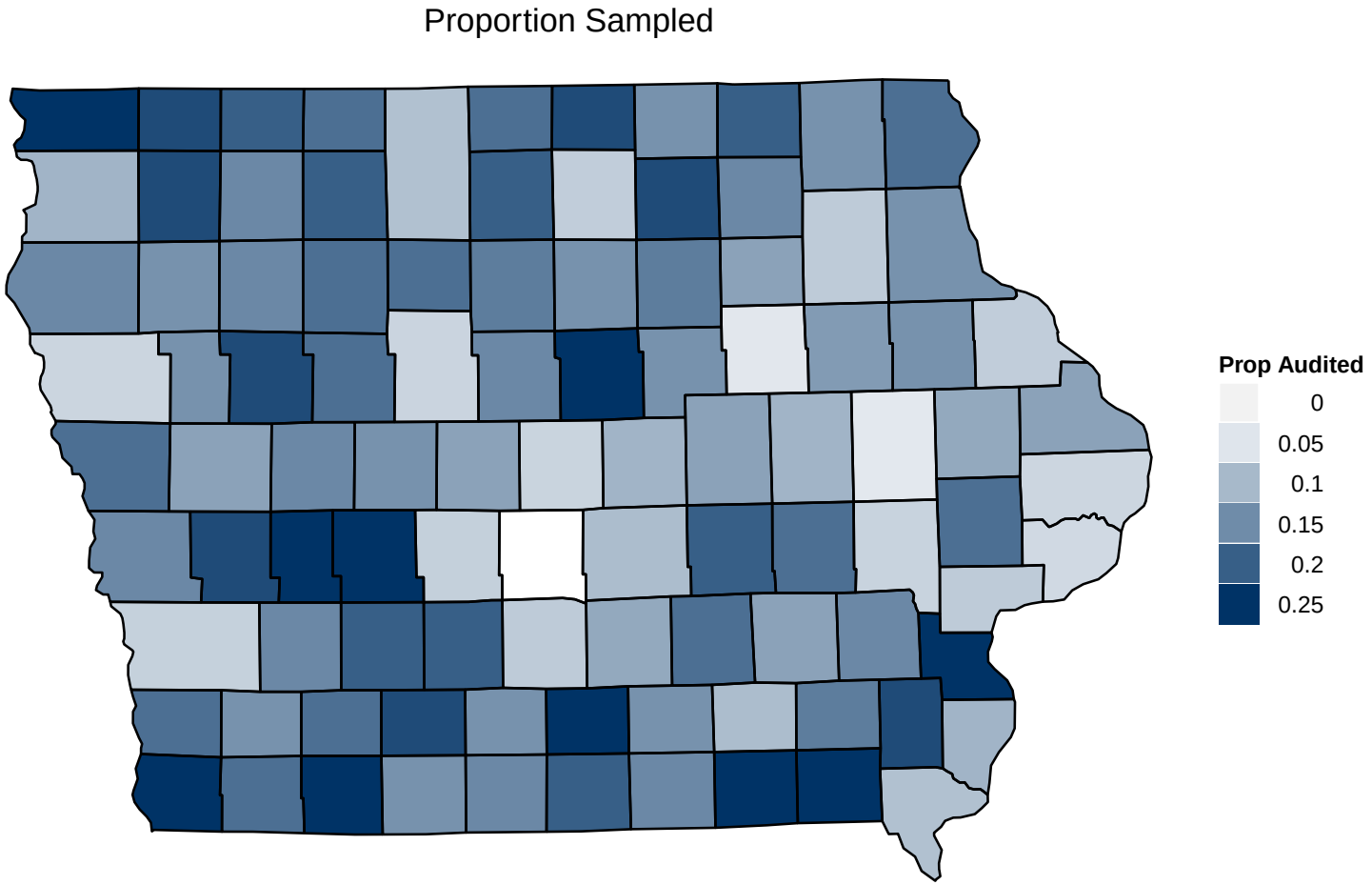
Registered Voters



Assessing Iowa Bill



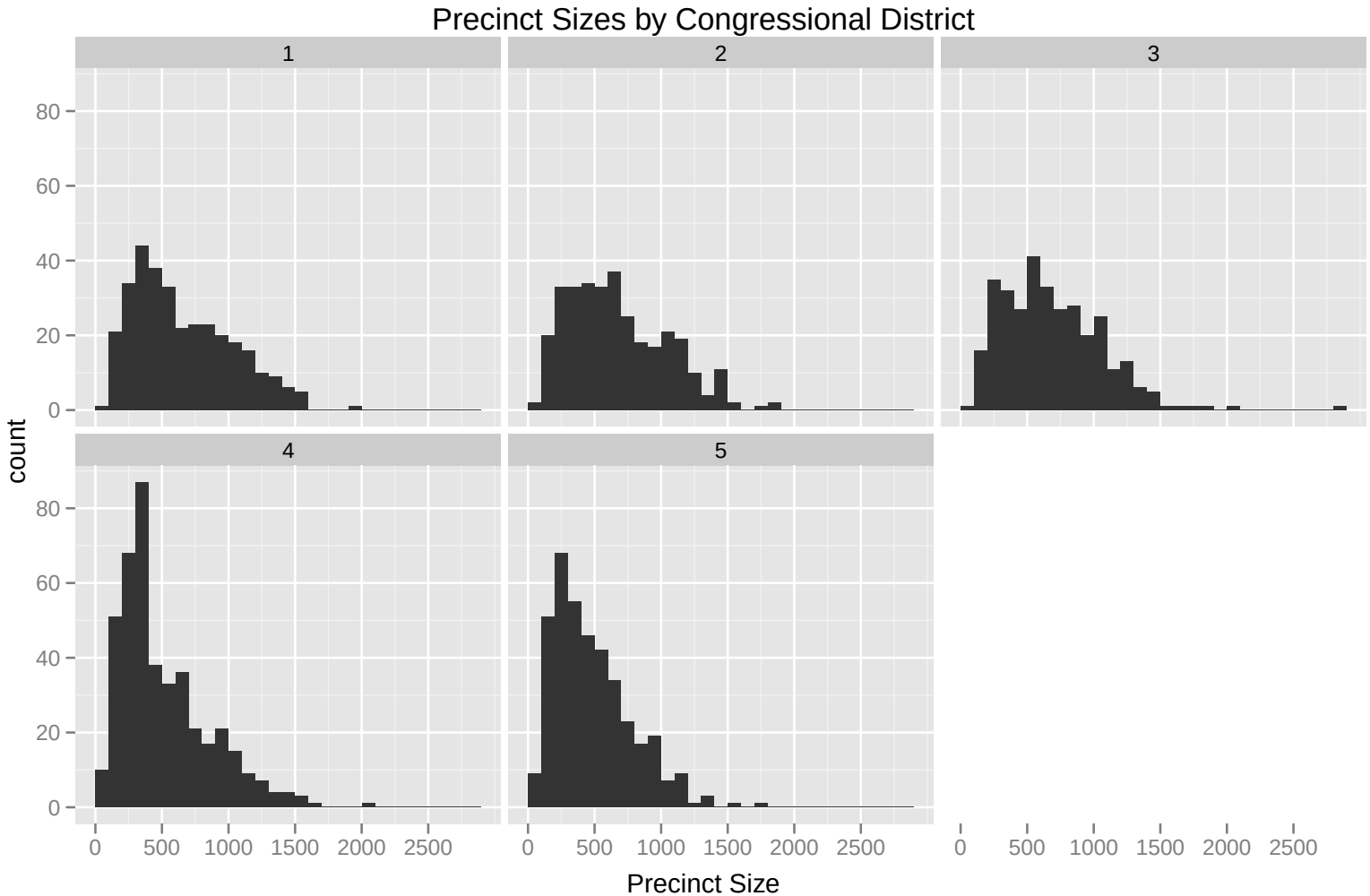
Assessing Iowa Bill



StatCom Team Analysis

- ISU StatCom team assessing proposed methodology
- Using 2006 Iowa election data
- Actual risk depends on apparent margin of victory
- Method seems inefficient for large margins
- Risk can be high for close races
- Handling varying precinct sizes

Precinct Sizes



How Good is the Tiered Method

- when the apparent margin of victory is 0.5% but the outcome of the election was wrong, the method only detected a miscount around 80% of the time.
- The loser was confirmed the winner 20% of the time

Benefits of Risk-Limiting Procedures

- Based on Power and Margin of Victory
  - X = number of miscounted precincts in sample
  - Power = $P(X > 0 | B_{min}$ miscounted precincts)
  - B_{min} = minimum number of miscounted precincts to overturn election
  - Power set at 99%
- Efficient
  - Samples as few Precincts as necessary

Sample Randomly McCarthy et. al. 2008

- Method 1: Randomly Sample Precincts
  - Based on Margin of Victory and Desired Power
  - Assumes equal precinct sizes
  - Uses a Hypergeometric Distribution to classify miscounts

Sample Randomly McCarthy et.al. 2008

- Within Precinct Miscount (WPM) is somewhat controversial (Stark 2009)
  - sets a maximum of a 40-pt shift in the percentage margin within that precinct (it seems rather arbitrary)
- $B_{min} = \left\lceil \left(N \cdot \frac{m}{2\,WPM} \right) \right\rceil$

Weight Precincts by Size Aslam & Aslam 2007

- Method 2: Sample Proportional to Size
  - There is an "adversary" who wants to tamper with as few precincts as necessary
  - Assigns each precinct a probability of being sampled proportional to its size
  - Assumes tampering would happen to larger precincts
  - requires the use of a computer

Ballot Based Auditing

- Method 3: Sample Ballots
  - Randomly sample individual ballots
  - Must have a way to cross examine ballots with the results
  - Would voting still be completely anonymous?
  - Logistical nightmare to execute

Problems in Iowa

- Precincts Sampled at County Level
  - The Size and Number of Precincts Varies heavily among Counties
- This seems like "Stratifying by County"
  - Does it make any sense to Stratify by County?
- What are possible solutions for this problem?

Current Ideas

1. Aggregate precincts (from entire state) into groups of equal size
   - How do you aggregate the Precincts?
   - Minimize $L = \sum_{j=1}^{n} \sum_{k>j}^{n} (p_k - p_j)^2$
2. Randomly sample from these new "Precincts"
   - Ideally the precincts being sampled would be spread across the state

Escalation Procedures

- Given a miscount is detected, what next?
  - Do Nothing?
  - Full recount?
- Statistically how should we proceed?
  - Suggestions from the audience?

Summary

- Where is balance between "Transparency" and "Risk"?
- Logistics of a Risk-Limiting Method must be simple
  - must be comparable to the Tiered method

Iowa Statisticians

- Participation from statisticians across Iowa
- Faculty
  - Drake University: Rahul Parsa
  - Iowa State University: Alicia Carriquiry, Dianne Cook, Heike Hofmann
  - University of Iowa: Russell Lenth
- Iowa State StatCom Team
  - Lisa Bramer, Luke Fostvedt, Randy Griffiths, Jonathan Hobbs, Eunice Kim, Adam Pintar, David Rockoff

Suggestions

- Questions?
- Comments?
- Suggestions?