

# 0 Connecticut Citizen Election Audit

## Risk Limiting Audit Prototype Observation Report

Independent Observation and Analysis  
of Connecticut's Risk Limiting Audit Prototype

January 17, 2022

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### Summary Recommendations

- We recommend Risk Limiting Audits (RLAs) not be mandated or conducted unless they can result in a full manual hand count that can confirm or change the initial result.
- We recommend that RLAs must be supervised by state officials, transparent, publicly observable, and publicly verifiable in all regards. They should follow standard definitions of Risk Limiting Audits, Evidence Based Elections, Software Independence, and The Principles and Best Practices for Post-Election Tabulation Audits.
- We recommend that RLAs be performed, at a minimum, for the top statewide race (Governor or Presidential Electors) and the closest margin statewide contest not otherwise subject to recanvass.
- We recommend that all statewide contests and congressional races, not recanvassed, be counted on each ballot selected for audit with RLA statistics calculated for each of those contests.
- We question if sufficient RLAs can feasibly be performed in Connecticut, unless and until the certification deadline is changed in law and the Connecticut Constitution. We question if RLAs should be performed without equipment that can add unique identifiers to ballots when they are initially scanned in polling places and when they are centrally counted.

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## CONTENTS

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Introduction	3
Requirements	4
Risk Limiting Audit Requirements	4
Risk Limiting Audit Limitations	5
Requirements for Justified Confidence	6
Suggestions/Considerations for the Working Group Recommendations	8
Suggestions/Considerations from the Prototype Observations	8
Suggestions from Connecticut Experience, Theory, and Other States	10
Summary Recommendations	12
About the Citizen Audit	13
The Connecticut Citizen Election Audit ("Citizen Audit")	13
Contact/Additional Information	13

# Introduction

The General Assembly appointed a Risk Limiting Audit Working Group to conduct Risk Limiting Audit (RLA) prototypes on the Nov 2021 election and to provide a report to the General Assembly in time for its 2022 session. The prototypes were conducted at the Secretary of the State's offices on January 6<sup>th</sup> and 11<sup>th</sup> 2022. On January 6<sup>th</sup> four districts in three towns were audited using the Ballot Polling RLA method. On January 10<sup>th</sup> three districts in two towns were audited using the Ballot Comparison RLA method. It is our understanding that the Working Group aims to create the report to the General Assembly by the end of January.

Three members of the Connecticut Citizen Election Audit (Citizen Audit) observed the prototypes on January 6<sup>th</sup> and two members observed the prototypes on January 10<sup>th</sup>. This is our Observation Report of those observations and advice to the RLA Working Group.

This report will not have our usual level of vetting and supporting documentation due to the need to provide feedback and recommendations to the RLA Working Group in time for consideration in their report.

All Citizen Audit observers of the prototypes have been a part of the Connecticut Citizen Election Audit for over twelve years. All are current or past board members. The Executive Director and observer, Luther Weeks has extensive experience with Risk Limiting Audits since 2009, participating in developing, observing, or executing RLA prototypes in CO, VA, and most extensively in RI. The Citizen Audit's experience independently observing post-election audits in Connecticut includes all such audits since 2007, with observers present at over 350 local counting sessions and reviewing all official audit reports submitted by municipalities in general elections and significant primaries.

# Requirements

This section serves as background on requirements of Risk Limiting Audits<sup>1</sup> (RLAs) and for their use in providing *Justified Confidence* in elections to the public. It is critical for our recommendations to the Working Group as they contemplate recommendations to the General Assembly.

## Risk Limiting Audit Requirements

There is no Federal or other official definition of Risk Limiting Audits. However, most recognize the definitions and requirements of three experts long involved in the creation of the statistics and methods of Risk Limiting Audits: Prof Philip Stark of UC, Berkley, Prof Ronald Rivest of MIT, and Mark Lindeman Ph.D of Verified Voting. Requirements set forth here come from our interpretation of their work:

- “[Risk Limiting Audits] provide statistical assurance that election outcomes are correct by manually examining portions of the audit trail—paper ballots or voter-verifiable paper records.”<sup>2</sup>
- Risk Limiting Audits are required to be based on trusted provable ballot security.

Based on our observation of the current post-election audits in Connecticut, the security of ballots is highly questionable, with the majority of towns providing the opportunity for single individuals to access ballots alone and undetected for hours, with ballots protected by seals that can be compromised within a few seconds<sup>3</sup>, with no established seal protocols. In other cases, no seals or improperly applied seals.

- Risk Limiting Audits must result in a pre-defined level of statistical assurance of a correct outcome or result in a full hand count that confirms or changes election results.

In Connecticut, that means within 10 days of the election. Quite a challenge, in light of the limited time and all the other things that must be addressed in that 10 days. Note: Our current recanvasses do not include a full hand count, so they would not meet the requirements of Risk Limiting Audits.

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<sup>1</sup> When we capitalize Risk Limiting Audit we imply that they meet the criteria in this section. An audit using the same mathematics but unable to overturn incorrect results and failing to meet standard criteria could not, in fact be deemed “risk limiting”. Like many others we wish they were more accurately termed as Risk Limiting Tabulation Audits, as RLAs only address the accuracy of interpreting votes and their totaling.

<sup>2</sup> <https://www.stat.berkeley.edu/~stark/Preprints/gentle12.pdf>

<sup>3</sup> <http://ctvoterscount.org/CTVCdata/TamperIndSeals.mht>

- Risk Limiting Audits must include all ballots.

E.g. Polling place, absentee, Election Day Registration, and accepted provisional ballots – originally hand counted as well as originally machine counted. If the audit includes ballots rescanned by the UConn Audit Station, those that cannot or are not scanned by the Audit Station must be included in the audit..

- The standard for reading and comparing ballots to originals or the CVRs is voter intent, rather than expected machine interpretation, which is the standard used in the current post-election audits.

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## Risk Limiting Audit Limitations

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- RLAs say nothing other than that the purported winner was tabulated correctly enough with a defined statistical assurance or that a full recount determined the tabulated winner.
- RLAs say nothing about contests not subject to the audit.
- RLAs say little about the accuracy level of machine counting or hand counting.
- RLAs say nothing about the accuracy of voter lists, check-ins, machine, or ballot security.
- Unlike RLAs the current Connecticut post-election audits, when properly conducted, do assess the accuracy of voting machines. In turn, current Connecticut post-election audits say little about the validity of particular contests.
- The smaller the margin in a contest, the more ballots must be examined. The number of ballots to be counted in an RLA is highly dependent on the margin and almost independent of the number of votes cast in a contest.
- The fewer ballots in a contest, the sooner it would be more efficient to do a complete hand count than to add rounds or even initiate an RLA rather than perform a full recount.

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## Requirements for Justified Confidence

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Beyond meeting the requirements of Risk Limiting Audits, they are most useful if they provide evidence that can provide *justified confidence* in elections to the public, meeting many of the requirements of Software Independence and Evidence Based Elections<sup>4</sup>. Risk Limiting Audits which are performed by officials without producing evidence for the public can be useful, yet are not convincing to the public, candidates and their supporters that officials performed the audit as advertised.

For example, all aspects of our current post-election audits are open to close observation by the public. Recanvasses are open to the public and subject to close observation by candidate and slate representatives. RLAs should provide for opposing officials to perform and verify each aspect as they are required to do in the current post-election audits and recanvasses.

Some requirements for justified confidence include:

- Software Independence – that an erroneous result based on software error or fraud will be detected and corrected. That is, software errors during the initial counting of votes or software errors during an audit will not be able to affect the final certified result.
- Evidence Based – providing evidence to the public that the results and other parts of the election are transparent and can be independently verified.
- In audits, the public should be able to observe that each vote is interpreted, counted, and totaled correctly.
- That the public can independently observe and verify that correct ballots are selected based on random numbers chosen.
- In audits, that any data generated by computer, such as pseudo random numbers and CVRs can be seen and verified by the public. That is, pseudo random number generator algorithms are known such that the public can independently take the random seed and generate those same numbers; that the public can obtain a copy of CVRs (at least for audited contests) prior to the generation of random seeds, and independently verify that the CVRs add to the claimed result, and that paper ballots are correctly selected, interpreted, and input, and for Ballot Comparison Audits compared to specific CVRs.
- That the public has evidence that ballot security protocols are strong and followed.
- Double checking of every aspect of the audit by officials from opposing interests. E.g. the ARLO audit software logs that two officials of opposing interests attest to every vote counted in hand

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<sup>4</sup> <https://www.stat.berkeley.edu/~stark/Preprints/evidenceVote12.pdf>

samples. That any vote interpretation is jointly agreed to by those officials and the pulling of correct ballots is agreed to by those officials. Public observers should be given the opportunity to observe the accuracy of the ballot pulling, interpretation, and data entry. Double checking and seal recording is included in the current post-election audits, yet often not followed in practice. At a minimum, similar requirements must be included in RLAs, supervised, and enforced.

- In addition to observing everything close enough, the public needs access to all the data input, stored, or generated in the audit, and has access to algorithms articulating what the software is supposed to generate, such that the public could repeat and verify such calculations from the data.

# Suggestions/Considerations for the Working Group Recommendations

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## Suggestions/Considerations from the Prototype Observations

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In general, we would not hold a prototype to the same standards as an actual RLA. Here we note mostly the aspects of the prototype which did not meet the criteria we would apply to an actual RLA.

### Transparency for an Actual Audit:

- The ballot pulling audit was flawed in that: The location of ballots selected was not marked in the piles. And the ballots were not kept in order so they could be replaced in piles, such that;
  - If there had to be a 2<sup>nd</sup> round the selected ballots could not be identified individually if they were selected again.
  - It would be more difficult to find 2<sup>nd</sup> round ballots in the piles since there were now some missing in each pile.
  - If, as actually happened, not all ballots drawn were actually selected, it would have been impossible to go back and correct the problem, with the only realistic solution to start over with a new random seed
- Every operation should be double checked in some way by two officials, hopefully of opposing interests. And, of course, so observers could watch and check. In addition to pulling ballots: counting the stacks, adjudicating votes, and counting the votes.
  - In both ballot polling and ballot comparison prototypes, in general, counting and stacking ballots was done by a single official.
  - Selection of ballots was done by a single official. This was less of a problem for ballot comparison because of “stickering”, such that each ballot with an identifying number and associated QR code.
- An official should supervise so to assure that each person understands the procedures and actually follows them, initially, and throughout the audit.

Some suggestions for improving transparency and public verification

- Laptop screens for data entry should be projected so all can easily see, and the screen recorded, as they were in the ballot comparison audit.
- Someone should announce what is going on when data entry is starting, when random seeds are input, and ballot selection starts etc. Otherwise, it can be difficult for observers to understand the process and the critical steps.



- All printouts such as the selection list and results should be captured and made available to the public online.
- The random seed drawing numbers should be made available to the observers and online,
- The pseudo random number generator algorithm should be public so that with the random seed, the public can verify the random ballots selected correspond to the algorithm. Similarly, all the statistical algorithms.
- CVRs, at least for contests being audited, must be posted and made available to the public prior to the random seed drawing. They should be in a format easily readable into a spreadsheet, so that the public can easily verify the totals of the CVRs in ARLO used in a Ballot Comparison Audit.
- The ballot manifest must be made available to the public online.
- There should be two pull sheets for each selected ballot, of two colors, not the same as any ballot colors, especially for ballot polling audits. One sheet replaces the pulled ballot and one stays with the pulled ballot, then:
  - Any questions about potential incorrect pulls can be resolved by counting in the pile again, and if necessary, replacing the error and pulling the correct ballot.
  - If more need to be pulled for a second round, the sheet can replace the previously pulled ballot in the count
  - The repulled ballot can be identified in the pulled pile
  - In a real audit, presumably all the pulled ballots may be from different towns, so they need to be added up publicly in a spreadsheet or by ARLO and their information recorded and made public.

#### Other Comments and Suggestions:

- In a real audit the date, time, and location should be published well in advance – no reason that cannot be done prior to the election, even in the Election Calendar.
- Detailed audit procedures need to be published in advance of the election, enforceable, and enforced.
  - Experience has shown with our observations and analysis of the current post-election audits, that tentative, unenforceable procedures are not followed and not used or apparently even read by officials when left on their own.
  - Someone other than the local officials involved should be tasked with making sure the officials follow the published procedures and apply corrections when necessary to recover from failure to follow procedures.

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## Suggestions from Connecticut Experience, Theory, and Other States

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Suggestions in this section are based on Connecticut law and election organization, our observations of the current post-election audits, experience in other states, and the literature/definitions of Risk Limiting Audits, Software Independence, and Evidence Based Elections.

- Risk Limiting Audits that meet the recognized criteria of the potential for a full hand count and being completed prior to certification would be difficult to complete within the 10 days specified in Connecticut law, and for state races as specified in the Connecticut Constitution.

It would be difficult for registrars to participate while also being responsible for recanvasses at the same time. Especially with recently extended deadlines in Connecticut for counting ballots, and with likely future calls for extended deadlines for accepting and curing absentee ballots – or Federal legislation requiring such extended deadlines.

- Based on public observation and review of official post-election audit reports from the current, post-election audits, it is highly unlikely that local officials could be depended upon to follow Risk Limiting Audit procedures without well-trained and qualified supervision.
- It would be very difficult for the public to observe, verify and trust RLAs if portions are conducted in 169 towns on their premises.
- Unless audits are conducted in a very tight time frame in all municipalities, it would be difficult to perform them in a timely manner, especially if multiple rounds are required.
- **We recommend<sup>5</sup> RLAs be conducted in one or several locations around the State with local officials transporting ballots to those locations, with knowledgeable staff there to assist in handling equipment and assuring that procedures are followed. Perhaps with staff there to assist in performing the audits, perhaps not requiring local officials to remain there for the duration.**
- **We recommend that state funding be considered to cover all aspects of the audits, including the time and mileage of local officials and perhaps the independent hiring of staff to perform the audits, including pulling, interpreting and recording votes.**
- **We recommend that contests chosen for RLAs not be chosen by officials after the election. Unless it is performed by some process or standard that would be perceived as unbiased for all.**

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<sup>5</sup> Recommendations are in Bold.

- It should be recognized that RLAs of wide margin, less interest contests, while easier to audit are of less value to the public and election contests with close margins and contests with high interest, such as Governor, President.
- **We recommend that at least initially, RLAs be limited to state-wide contests and perhaps congressional races. And only in even year general and primary elections.**
- **We recommend that RLAs be performed, at a minimum, for the top statewide race (Governor or Presidential Electors) and the closest margin statewide contest not otherwise subject to recanvass.**
- When an RLA is performed on one or more contests on a ballot, other contests can be audited at the same time with their votes recorded for the other contests as well, at low incremental cost and effort. For those other contests statistics can be calculated by ARLO determine the % statistical assurance that such contests were correctly decided.
- **We recommend that all statewide contests and congressional races, not recanvassed, be counted on each ballot selected for audit with RLA statistics calculated for each of those contests.**
- **We recommend that all contests audited use the Ballot Comparison Method of auditing unless statistical estimates show that for closest audited contest another method would be less work than a Ballot Comparison Method.**
- **We recommend that the Batch Comparison Audit Method be further evaluated for use in Connecticut, in conjunction with recounting by the UConn Audit Station. With Connecticut's existing large-volume polling places this may or may not be a reasonable alternative.**
- **We recommend that current post-election audits be continued based on their use in evaluating voting machine accuracy and contribution to providing public confidence in municipal contests and other local and state legislative contests.**
- **We recommend that RLAs are implemented centrally or semi-centrally under supervisors charged with assuring procedures are followed.**
- **We recommend that even if RLAs are not implemented, that all current post-election audits be conducted centrally or semi-centrally using the UConn audit station under supervisors charged with assuring procedures are followed. We recommend that all such machine audits included random comparison of some CVRs to the paper ballots as UConn demonstrated during the 2020 cycle.**

- How to handle originally hand counted ballots and those that cannot be run through the UConn Audit Station may be a significant challenge. Other states for initial counts, routinely scan all ballots – where they cannot scan ballots, they “remake” those ballots as scannable ballots by two officials of opposing interests remaking the ballots. They mark and store originals and remade ballots so they can be checked in recounts and audits.
- **We recommend that as part of a Ballot Comparison Audit all unscannable ballots be remade and scanned.**

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## Summary Recommendations

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# About the Citizen Audit

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## The Connecticut Citizen Election Audit ("Citizen Audit")

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Our purpose is to increase integrity and confidence in elections, for the benefit of the voters of Connecticut. We provide independent audit observations, independent audits, and independent reports focusing on the integrity of elections and election administration. We are non-partisan and strive for objectivity and integrity in our work. The Citizen Audit has observed and reported on primary and general elections, since the statewide implementation of optical scan voting in Connecticut in 2007.

### EXECUTIVE DIRECTOR/BOARD

Significant decisions and reports are approved by majority vote of the Board. Members of the Board are experienced volunteer observers, with diverse skills, political affiliation, and geographic representation. Current members of the Board are:

- Luther Weeks, Executive Director
- Kathleen Burgweger, Jean de Smet, Aaron Goode, Julie Lewin, Tessa Marquis, Mary Rydingsward, Jan-Maya Schold, Douglas Sutherland, and Victoria Usher

### CITIZEN-POWERED

The Citizen Audit is an entirely volunteer, citizen-powered organization. We appreciate every Citizen Audit volunteer. Without dozens of volunteers spending days and hours on each election objectively observing, auditing, and reporting, the promise of publicly verifiable elections could not be pursued and will never be attained.

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## Contact/Additional Information

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Luther Weeks, Executive Director, [Luther 'at' CTElectionAudit.org](mailto:Luther@CTElectionAudit.org), 860-918-2115. All reports and additional supporting data are available at <http://www.CTElectionAudit.org>.