

GEORGIA SECRETARY OF STATE **BALLOT IMAGE AUDIT REPORT**

JULY 2026

PURPOSE

This purpose of this report is to inform the Georgia Secretary of State of the results and findings of the 2026 May and June ballot image audits by Enhanced Voting. The report includes details which were used by the Secretary of State during the certification process of the 2026 May General Primary Election and Municipal General Elections and subsequently the 2026 June Primary Runoff.

AUTHORS

Aaron Wilson, President

Steven Musick, Chief Technology Officer

Matt Bernhard, PhD., Director of Security and Auditing

Mike Garcia, PhD., Vice President of Product and Strategy

Enhanced Voting

Executive Summary and Findings

Enhanced Voting staff conducted a ballot image audit in May and June 2026, with data collected from each of the 159 Georgia county election offices. The audit examined 2,081,900 ballot images from Liberty Vote Voting System tabulators deployed during the May 2026 General Primary and Nonpartisan General Elections held on May 19, 2026, and 1,111,856 ballot images from the June 2026 Primary Runoff. The audit used the Enhanced Audit software from Enhanced Voting to examine the ballot images and scrutinize election outcomes for all 1,785 contests in May and 91 contests June.

The 2026 Audit examined all contests on all ballots cast during the May 19 and June 16 elections using ballot image data, batch-level results, and cast vote records to independently tabulate and compare results to those from the voting system. Enhanced Audit derived results from ballot images using optical character recognition over the human-readable portion of each summary ballot image or by detecting voter marks on images of hand-marked ballots.

The ballot image audit produced the following summary findings for the May 19 elections:

- The audit confirmed the election results and the associated winners in all 1,785 contests in the election (including both party primaries, statewide nonpartisan contests, county primaries, and municipal elections).
- This was the largest image audit ever conducted on a primary election, and largest overall in terms of ballot styles (16,003).
- 16 summary ballots had discrepancies between the human readable portion and the tabulated interpretation, none of which impacted election outcomes in any contest: 13 were due to different versions of election definitions between one ballot marking device and one scanner in two counties, and 3 were due to a tabulation issue in one county.
- The audit found 74 discrepancies in hand-marked paper ballots between the original count and the audit attributable to voter intent interpretations made by reviewers at the county level while reviewing the ballot images during the audit.
- An additional 69 differences found in hand-marked paper ballots between the original count and the audit were attributable to failure to re-export cast vote records when additional images were scanned.
- The human-readable portion of 99 summary ballots and 3 hand-marked ballots were insufficiently legible to be interpreted in the audit; however, these ballots did not impact any election outcomes, due to their distribution across counties and the margins in the associated contests.

Table 1 – May 19 Audit Statistics

Statistic	Value
Total Ballots	2,081,900
Total Ballots Audited	2,081,900
Summary Ballots Audited	2,038,067
Hand-Marked Ballots Audited	43,833
Contests Audited	1,785
Ballot Styles Audited	16,003
Ballot Images Requiring Manual Review	23,655 (1.14% of the total ballots)
Ballots with Discrepancies	159 (see Table 3)

Table 2 – May 19 Accuracy by ballot type

Ballot Type	# Ballots	# Images with Discrepancies	# Unreadable Images	Accuracy
Summary Ballot with QR Code	2,038,067	16	99	99.999%
Hand-Marked Ballots	43,833	143	3	99.674%

Table 3 – May 19 Discrepancies by discrepancy type

Discrepancy Type	# Discrepancies
Adjudication Differences	74
CVR Export Issue	69
Configuration Issue	13
AuditMark Mismatch	3
Unreadable	102

The ballot image audit produced the following summary findings for the June 16 Runoff:

- The audit confirmed the election results and the associated winners in all 91 contests in the runoff elections (including both party runoffs).
- This was the largest image audit ever conducted on a runoff election.
- No summary ballots had discrepancies between the human readable portion and the tabulated interpretation.
- The audit found 15 discrepancies in hand-marked paper ballots between the original count and the audit attributable to voter intent interpretations made by reviewers at the county level while reviewing the ballot images during the audit.
- One additional difference found in hand-marked paper ballots between the original count and the audit were attributable to failure to re-export cast vote records when additional images were scanned.
- 7 hand-marked ballots had discrepancies between original tabulation and the audit due to a ballot printing issue in one county.
- None of these discrepancies impacted any election outcomes, due to their distribution across counties and the margins in the associated contests.

Table 4 – June 16 Audit Statistics

Statistic	Value
Total Ballots	1,111,856
Total Ballots Audited	1,111,856
Summary Ballots Audited	1,079,408
Hand-Marked Ballots Audited	32,448
Contests Audited	91
Ballot Styles Audited	8,862
Ballot Images Requiring Manual Review	1,149 (0.1% of the total ballots)
Ballots with Discrepancies	23 (see Table 36)

Table 5 – June 16 Accuracy by ballot type

Ballot Type	# Images	# Images with Discrepancies	# Unreadable Images	Accuracy
Summary Ballot with QR Code	1,079,408	0	0	100%
Hand-Marked Ballots	32,448	23	0	99.93%

Table 6 – June 16 Discrepancies by discrepancy type

Discrepancy Type	# Discrepancies
Adjudication Differences	15
CVR Export Issue	1
Printing Issue	7

Table of Contents

Executive Summary and Findings	ii
1. Background and Methodology	1
1.1. Audit Timeline	2
1.2. Definition of a Discrepancy	3
2. Findings for the May 19 elections	4
2.1. Election Definition Configuration Issues	4
2.2. Muscogee County	5
2.3. Fulton County	6
2.4. Missing Backs Resulting in Unreadability	7
2.5. Image Quality Resulting in Unreadable Summary Ballots	7
2.6. Cast Vote Record Export Issue	7
2.7. Voter Intent and Adjudication Issues.....	8
3. Findings for the June 16 elections	9
3.1. McDuffie County	9
3.2. Murray County	10
3.1. Voter Intent and Adjudication Issues.....	10
4. Historical Issues and Limitations	11
4.1. Poor image quality on a small percentage of ballots.....	11
4.2. High number of manual reviews required	11
4.3. Missing contest titles.....	13
4.4. Lack of write-in results from the original results file	13
4.5. Methodological Limitations.....	13
5. Reports by Reference.....	14
6. Appendix A: OCR Approach	15

1. Background and Methodology

The Georgia Secretary of State's Office contracted with Enhanced Voting to conduct a ballot image audit of the May 2026 General Primary and Nonpartisan General and June 2026 Primary Runoff. The State of Georgia used Liberty Vote's Democracy Suite to conduct these elections, during which voters marked ballots either by hand (producing hand-marked ballots) or via an ImageCast X Ballot Marking Device (producing summary ballots). Ballots were tabulated using either the ImageCast Precinct scanner (for Advance and Election Day voting) or the ImageCast Central (for hand-marked absentee by-mail and Provisional ballots).

Summary ballots represent all votes both by a QR code as well as human-readable text, which can be reviewed by the voter to verify that it accurately reflects their selections prior to inserting their ballot into the scanner. Hand-marked ballots encode voter selections in ovals which are laid out on a grid of timing marks, with each oval corresponding to a possible selection in the contest.

To tabulate these ballots, the Liberty Vote ImageCast scanners utilize two different methods: for summary ballots, tabulators read a QR code that contains the voter's selections; for hand-marked ballots, tabulators identify which ovals have been filled in by the voter. For each ballot, a record of its contents is created at time of reading called a Cast Vote Record (CVR), and an image of the ballot is saved along with the CVR. Liberty Vote also appends the CVR for the specific ballot to the image of the ballot (called the AuditMark). Election results are created by aggregating CVR files across a jurisdiction and producing an Election Results file containing the sum of all CVRs for each selection in each contest in a jurisdiction.

Enhanced Voting's audit collected data on the election using these three data sources: ballot images, CVRs, and election results files. The audit included training counties on supplying data for the audit, collecting data from counties and the state for the audit, and performing automated and manual reviews of all data submitted. Enhanced Voting used its ballot image auditing tool, Enhanced Audit, to automatically process all ballot images, election results files, and cast vote records (CVRs) and compute a tally for all selections and contests in the May 2026 elections that were independent from the original voting system tabulation.

Enhanced Audit uses optical character recognition (OCR) to examine only the human-readable text on Georgia's summary ballots (comprising over 97% of ballots cast during both of the May 19 and June 16 elections). Enhanced Audit also uses mark-sensing for

hand-marked ballots, and computes tallies for all contests from these data sets. It then cross-references its tabulation against the election results files at a batch level, as well as cross-referencing individual ballot tabulation against the cast-vote record for each ballot.¹

Auditors and reviewers can manually review ballots images. In cases where image processing cannot determine what votes are reflected on a ballot, or in cases where discrepancies are detected between the tabulation of an image and its CVR, the ballots are flagged for review by county reviewers.

In exceedingly rare cases when discrepancies in summary ballots cannot otherwise be explained, Enhanced Voting undertakes a subsequent step of manually decoding the QR code on a discrepant ballot image and comparing with the human-readable portion of the ballot image by eye. This is only ever done as a final confirmation step, and no result of this analysis is reflected in the reports output by Enhanced Audit nor in the preceding or subsequent analyses presented in this report. The only ballot images subject to this manual analysis represented in this report are the three May 19 images with incorrect AuditMarks. To date, no case has ever been identified where a manual decode of the QR code did not match the human readable selections across the nearly 10 million summary ballot images Enhanced Audit has processed through four elections in Georgia.

1.1. Audit Timeline

County officials began to upload their election results files, ballot images, and cast vote records into Enhanced Audit shortly after Election Day on May 19th. Uploading continued through the following week, and Enhanced Voting worked with state and county staff to resolve ballots that needed manual review and investigate potential discrepancies.

All 159 county audits of the May 19 elections were completed in advance of state certification on June 4, 2026.

County officials began to upload their election results files, ballot images, and cast vote records into Enhanced Audit shortly after Runoff Election Day on June 16th. Uploading continued through the following week, and Enhanced Voting worked with state and county staff to resolve ballots that needed manual review and investigate potential discrepancies.

All 159 county audits of the June 16 elections were completed in advance of state certification on July 2, 2026.

¹ For more technical detail on how Enhanced Voting analyzes ballot images, see Appendix A.

1.2. Definition of a Discrepancy

Enhanced Audit compares its independent interpretation of each ballot image against the image's corresponding cast vote record, as well as tallying its independent interpretations and comparing the summed independent interpretations against the reported election results. For the purposes of this report, a discrepancy is any time Enhanced Voting's interpretation of a ballot image positively disagrees with the original ballot interpretation.

In cases where a voter's selection is not readable in Enhanced Audit due to scan quality issues, file integrity issues, or other factors not related to the performance of the election, these images will be interpreted as undervotes. In some cases, unreadable images will thus result in tallies that do not align with the original voting system tally; however, because a determination could not be made about how the ballot should have originally been tabulated, these cases are separated from obvious discrepancies.

2. Findings for the May 19 elections

This section contains details about findings during the audits. None of the findings presented in this report impacted any election outcomes. These are presented to illustrate the function of the ballot image audit as well as to document issues that were corrected prior to final certification.

2.1. Election Definition Configuration Issues

In Candler County, we observed 12 ballots with CVR discrepancies for either the Board of Elections District 2 contest, E-SPLOST, or both. All 12 of these ballots were scanned on the same tabulator, and the issue appears to have stemmed from a candidate being disqualified in the BOE District 2 contest (Reagan Donaldson). It appears that the tabulator in question was programmed with the candidate, and then the candidate was later marked removed, but the ballot marking device configuration was not updated to also remove the candidate. This caused votes for that candidate to be removed, and also caused the contests to be misaligned with the votes on the remainder of the ballot: a vote for Reagan Donaldson became a vote for "Write-In" in the BOE contest, and a vote for "Yes" in the E-SPLOST became a vote for "No", as contests were shifted left relative to the position of the votes in the vote vector. As this only affected 12 ballots, the BOE contest only had one qualified candidate, and the E-SPLOST contest had a margin of greater than 12, no outcomes were affected by this finding. Diagram 1 visualizes this issue.

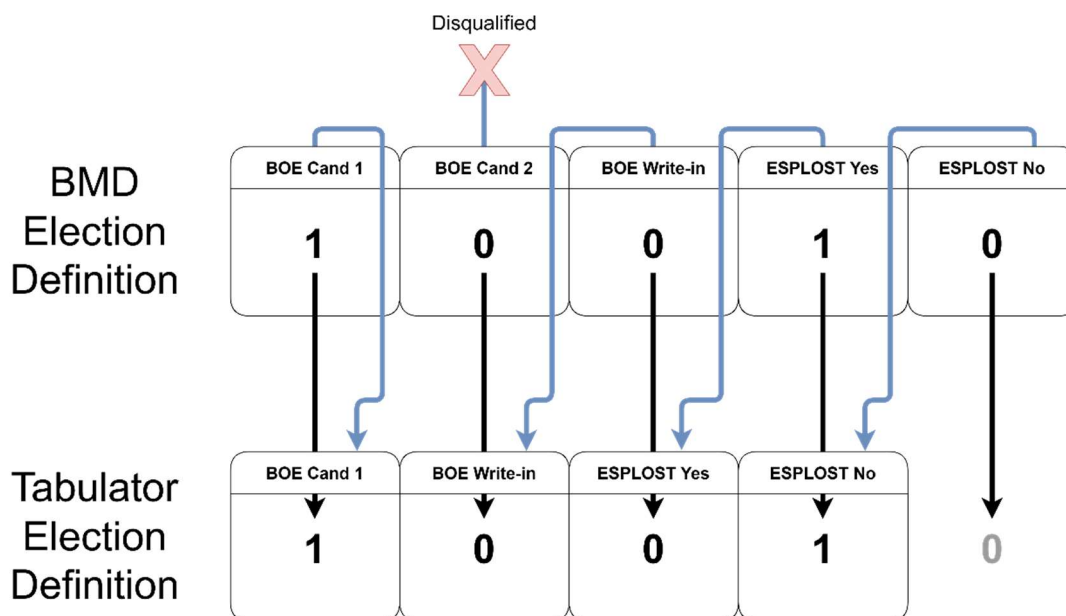


Diagram 1 – Illustration of how programming mismatches with disqualified candidates can cause votes to be shifted to incorrect candidates

Gordon County also encountered this problem one contest on one ballot, as the ballot was a remade federal-only ballot (and thus contained only federal contests). Like Candler County, it appears that the Ballot Marking Device on which this ballot was remade had a different version of the election definition that did not account for the disqualification of Uloma Ekpete Kama, causing the selections in the U.S. House District 11 contest on this ballot to be recorded incorrectly.

2.2. Muscogee County

Muscogee County had substantial image quality issues that resulted in 32 unreadable summary ballots (see Image 1).

For United States Senate (DEM) Vote for Jon Ossoff (I)	For Public Service Commissioner District 3 (DEM) Vote for Peter Hubbard (I)	Democrat Vote for	Democrat Vote for
For Governor (DEM) Vote for Derrick Jackson	For Public Service Commissioner District 5 (DEM) Vote for Sheila Edwards	Democrat Vote for	Democrat Vote for
For Lieutenant Governor (DEM) Vote for Richard N. Wright	For United States House of Representatives - District 2 (DEM) Vote for Sanford Bishop (I)	Democrat Vote for	Democrat Vote for
For Secretary of State (DEM) Vote for Penny Brown Reynolds	For State Senate District 15 (DEM) Vote for Tremaine "Terdy" Reese	Justice (Bethel) Vote for (I)	Justice (Bethel) Vote for (I)
For Attorney General (DEM) Vote for Tanya Miller	For State House of Representatives District 141 (DEM) Vote for Carolyn E. Hugley (I)	Justice (Warren) Vote for	Justice (Warren) Vote for
For Commissioner of Agriculture (DEM) Vote for Katherine E. Juhan Arnold	Democratic Party Question 1 (DEM) Vote for No	Justice (Warren) Vote for	Justice (Warren) Vote for
For Commissioner of Insurance (DEM) Vote for DeAndre Mathis	Democratic Party Question 2 (DEM) Vote for No	Judge (Brown, III) Vote for	Judge (Brown, III) Vote for
For State School Superintendent (DEM) Vote for Otha Thornton	Democratic Party Question 3 (DEM) Vote for Yes		
For Commissioner of Labor (DEM) Vote for Michelle Michi Sanchez			

Image 1 – Example of ballot image with unreadable voter selections

Votes across 13 hand-marked ballots were improperly adjudicated, where votes were adjudicated for a candidate that was clearly not selected by the voter (see Figure 2). This error had no impact on outcomes.

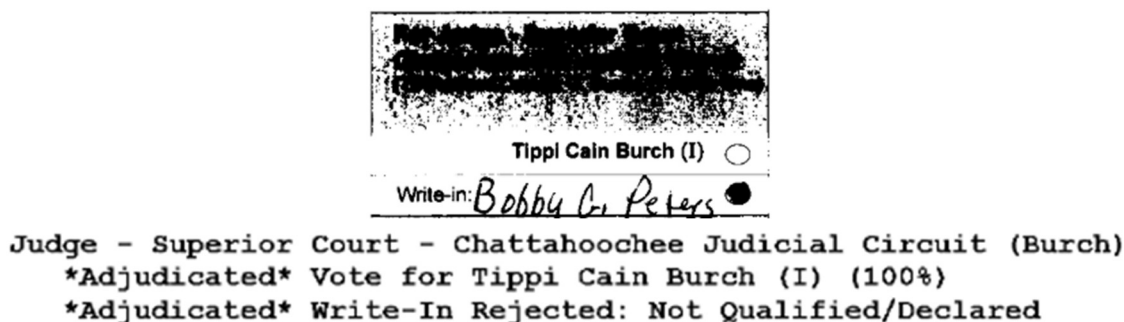


Image 2 – Example of incorrect write-in adjudication

An additional 8 hand-marked ballot had marginal voter marks that were not originally picked up by the voting system but were detected by Enhanced Audit (see Figure 3).

For District 1 House Representative Jon Ossoff (I) ☒	For District 2 House Representative Brett A. Hulme ☐ Jason Moon ☐ Nikki Porcher ☐ Michelle Michi Sanchez ☐ Christian Wise Smith ☐	County Representative Issue Although certain races are "non-partisan," should voters know the candidate's political affiliation before they vote? Yes ☒ No ☐
For District 3 House Representative Keisha Lance Bottoms ☒ Olu Brown ☐ Amanda Duffy ☐ Geoff Duncan ☐ Jason Esteves ☐ Derrick Jackson ☐ Michael "Mike" Thurmond ☐	For District 4 House Representative Peter Hubbard (I) ☐	City Council Issue Should members of city council abide by the long-standing tradition of not running for a seat to which appointed? Yes ☐ No ☒
For District 5 House Representative Josh McLaurin ☒ Nabilah Parkes ☐ Richard N. Wright ☐	For District 6 House Representative Craig Cupid ☐ Shelia Edwards ☐ Angelia Pressley ☐	City Council Issue Should the Mayor of Columbus be allowed a full vote on all council legislation? Yes ☒ No ☐
For District 7 House Representative Cam Ashling ☐ Dana Barrett ☐ Penny Brown Reynolds ☒ Adrian Consonery, Jr. ☐	For District 8 House Representative Sanford Bishop (I) ☒	City Council Issue Prior to placing a Data center in Muscogee County, should this be a question on the ballot for voters to decide? Yes ☒ No ☐
For District 9 House Representative Tanya Miller ☒ Robert "Bob" Trammell ☐	For District 10 House Representative Edward D. Harbison ☐ Tremaine "Teddy" Reese ☐ Alyssa Nia Williams ☐	City Council Issue Should local elections be decided in November during the general election, instead of in May during the primary? Yes ☒ No ☐
For District 11 House Representative Carolyn F. Hugley (I) ☒		

Image 3 – Example of marginal marks that were not in the original tabulation

2.3. Fulton County

Fulton County had 3 total discrepancies. All 3 were ballots that were scanned on an individual ImageCast Central scanner, across three batches. For all three ballots, the human-readable text and QR code agree with each other, but the image of the ballot disagrees with both the attached AuditMark and the cast vote record, which match each other. It appears that something is causing the scanner to attach a previously scanned ballot's AuditMark to a subsequently scanned ballot (typically the very next ballot, but in one case it appears to be the ballot after the next one). This causes the system to tabulate the ballot incorrectly. This was the only time this issue was documented in this audit, and none of the resulting discrepancies affected any outcomes.

2.4. Missing Backs Resulting in Unreadability

For 3 summary ballots, one each in Bryan, DeKalb, and Dougherty counties, the back of the ballot was scanned as a completely blank page. All three of these ballots should have contained voter selections on the back (and the original tabulation indicates that it did).

2.5. Image Quality Resulting in Unreadable Summary Ballots

Poor image quality impacted 96 summary ballot images, and therefore these images contained at least one contest that neither Enhanced Audit's OCR nor human review could determine the voter selection. This includes the 32 in Muscogee previously discussed.

County	Unreadable Ballots
Muscogee	32
Cherokee	31
Henry	23
Tift	4
Upson	2
Coffee	1
Dougherty	1
Macon	1
Newton	1
Total	96

2.6. Cast Vote Record Export Issue

In five counties, there was a discrepancy between when the cast vote record was exported and when the ballot images were exported. In these cases, this caused the identifier used for centrally scanned ballots to misalign, especially if the ballots have been rescanned. As the identifiers are sequential, the same set of identifiers can be generated multiple times, resulting in a ballot image in one export with an identifier that gets assigned to a different ballot image in a subsequent rescan or export. The same applies for exports of the CVR, meaning that if we received a ballot image archive and a CVR file that were not generated at the same time, it was possible for mismatches to arise because we were comparing ballot 1's image to ballot 2's CVR, or vice versa. Fortunately, in this election no data was lost during the rescans of the 69 ballots impacted by this issue, so the vote tallies did not change and there for this issue did not impact any outcomes.

2.7. Voter Intent and Adjudication Issues

The remaining discrepancies not documented in the forgoing sections comprise of marginal voter marks that were interpreted differently by Enhanced Audit than the original tabulation, and adjudication decisions that differed from those initially made during the canvass period. These comprise 74 discrepancies across 38 counties. 21 occurred in Muscogee, 3 occurred in 5 counties, 2 in 6, and 1 in 26.

3. Findings for the June 16 elections

3.1. McDuffie County

McDuffie County had seven hand-marked ballots that recorded discrepancies between the original tabulation and the audit tabulation. 139 hand-marked ballots were cast, and 129 were remade onto ballot-marking device ballots. Of the remaining 10, 7 ballots from batches 1 and 2 had discrepancies, while the 3 ballots in batch 10 did not. All 7 ballots from batches 1 and 2 recorded undervotes in the Republican PSC District 5 contest, however the ballots were clearly marked with 6 votes for Josh Tolbert and 1 vote for Bobby Mehan.

In addition to the incorrect tabulation, the AuditMark for these ballots is missing the contest title text, depicted in Image 4. Almost all the hand-marked ballots in McDuffie County were remade due to a printing error that caused the tabulator to not accept original ballot. It is possible this same printing issue impacted the 7 ballots that encountered this issue; however, a conclusion cannot be reached without further investigation.

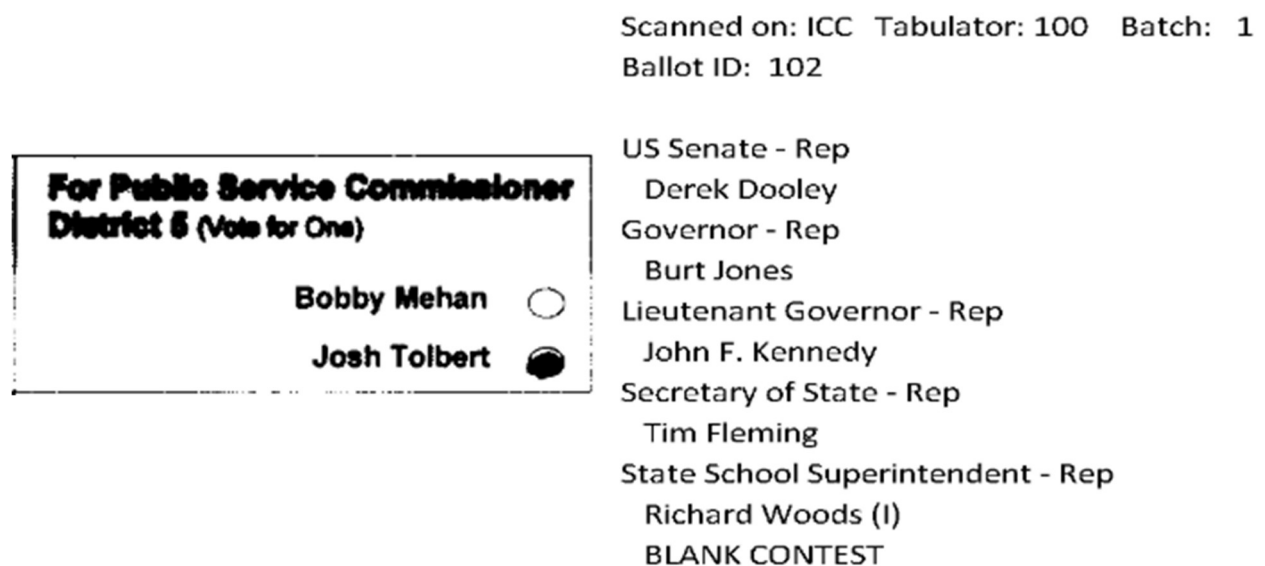


Image 4 — Ballot marked for Tolbert, AuditMark displaying an undervote and missing the contest title

3.2. Murray County

Murray County provided ballot images one day after providing a cast vote record file. It appears that in the interim between when the CVR was generated and the image archive was created, a ballot was rescanned (the paper ballot corresponding to image 00090_00004_000001.tif in the Pre_004 Spring Place combo).

This ballot had already been scanned once during this rescan and appears to have overwritten the image of the ballot corresponding to image 00090_00002_000001.tif in the Pre_002-Town combo. 00090_00004_000001.tif and 00090_00002_000001.tif were identified to be separate scans of the same physical ballot by examining the uniqueness of the voter marks.

This caused the prior image for the Town ballot to get overwritten, however the cast vote record file was not also exported with the overwritten data. Therefore the image archive has two votes for Nabilah Parkes in the set of absentee ballots and 18 votes for Josh McLaurin in the Democratic Lieutenant Governor contest, while the original results and cast vote record file have 1 and 19, respectively.

3.1. Voter Intent and Adjudication Issues

The remaining discrepancies not documented in the forgoing section comprise of marginal voter marks that were interpreted differently by Enhanced Audit than the original tabulation, and adjudication decisions that differed from those initially made during the canvass period. These comprise 15 discrepancies across 14 counties. An example is provided in Image 6.

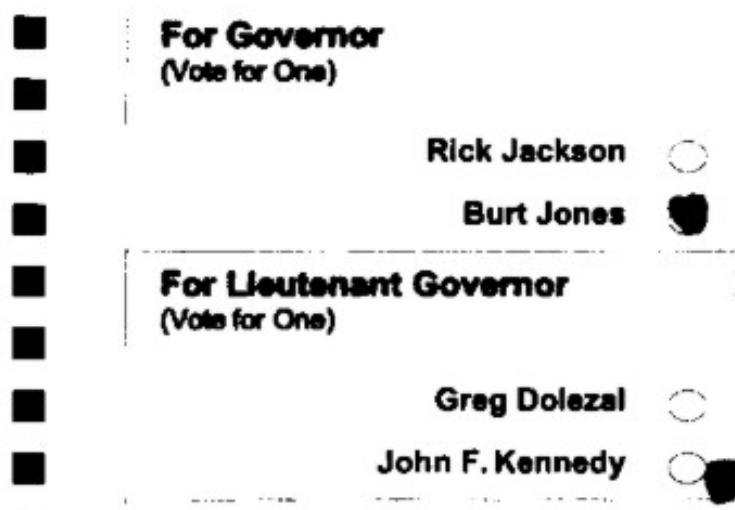


Image 6 — Marginal voter mark that was not originally interpreted as a mark but was determined to reflect voter intent.

4. Historical Issues and Limitations

4.1. Poor image quality on a small percentage of ballots

While the Enhanced Audit system was able to automatically interpret 98.87% and 99.96% of ballots the May and June elections, respectively, some ballots still required manual review due to image quality. The images were captured by the Liberty Vote tabulators at 200 dots per inch (DPI) black and white (B&W). This was sufficient quality to perform OCR except when the image quality was reduced by poor printing or scanning conditions. The May elections were far more impacted by these issues than the June elections.

The audit found several reasons for reduced image quality, including:

- **Vertical black line:** some images had a black line running down the entirety of the image, which is often caused by dead pixels on the image sensor or dirt and other debris on the scanner glass. This was particularly impactful if the line ran through the ballot style name.
- **Scanner artifacts:** ballot images with other distortions or artifacts that don't appear to be printer related were found and are most likely due to the cleanliness of the scanner. Depending on the severity and the location of the artifacts, these caused varying levels of difficulties for the OCR engine.
- **Faint ballot text:** ballot images in a handful of batches across the state had text that was faint or faded to the extent of unreadability. See Image 1 for an example.

4.2. High number of manual reviews required

Compared to prior image audits in Georgia, the audit of the May elections required a substantially higher number of ballots to be manually reviewed, both in absolute terms and proportional to the total number of ballots.

	2024	2025	May 2026	June 2026
Total Ballot Images	5,297,264	1,581,539	2,081,900	1,111,856
Ballots Requiring Review	13,719	1,364	23,655	1,149
Percent Requiring Review	0.26%	0.09%	1.14%	0.10%

This is largely due to the nature of this primary election, and a couple of idiosyncrasies with many of its contests. Firstly, these ballots were much longer than ballots from other elections that have been subject to audit, including the June 2026 elections. If the probability that a given contest requires review is non-zero, this means that adding more contests increases the likelihood that a given ballot gets flagged for review, as it only requires the OCR to fail reading one contest to flag an entire ballot for review.

Secondly, several contests lent themselves to producing OCR failures at higher rates. Partisan ballots both had party questions of the form “Republican Party Question 1” or “Democratic Party Question 1”, where the difference between the questions was confined only to the last character in the name (i.e. a “1”, “2”, and so on). Additionally, because the selections for these contests were all “Yes”, “No”, or “BLANK CONTEST”, it was not possible to rely on the voter selections as corroborating evidence to bolster the OCR confidence in the contest identification. If there were any qualities that made the ballot difficult for the OCR to read the text, these contests were the most likely to fail. Party questions were not present on the June ballots, which further indicates that party questions are a particularly difficult type of contest to perform OCR on.

The additional length of the ballots compared with other audited elections also meant that if there were hardware issues with the ballot printers or scanners that disproportionately impacted a certain region of the ballot, it was more likely that those issues would impact readability in this election. Examining Image 1, almost all the unreadable contests are in the third column on the front page of the ballot. As this was the first audit of an election where the overwhelming majority of summary ballots had a third column, these issues may have been present in prior elections but were not detected by the audits because there was not an opportunity for it to impact voter selections. Similarly, issues with scanners failing to capture the back page of the summary ballot may not have been identifiable in past elections, as voter selections did not carry over to the back page for the vast majority of ballot styles. The June elections did not have any contests in the third column of the summary ballots, and the temporal proximity of the two elections and subsequent audits supports this theory.

Therefore, the May audit saw a higher rate of manual reviews required likely due to the length of the ballots and the nature of the contest titles surfacing image production issues that may have been present in the past or may have only surfaced for the first time in this election. In either case, Enhanced Audit’s manual review fallback still allowed for confident determinations to be made for over 99.99% of ballots.

4.3. Missing contest titles

In contrast to prior audits in the State of Georgia, these audits found no instances of summary ballots missing contest titles in either the May or June elections.

4.4. Lack of write-in results from the original results file

The original results file provided by the counties did not include the write-in vote totals for contests. This prevents the audit from being able to compare the original vote totals for write-ins with the audited vote totals. However, the cast vote records do contain write-in selections so at least one point of comparison was available for write-ins. No contests were observed that contained qualified write-ins with enough votes to impact any outcome.

The June elections did not have any write-in candidates and therefore were not impacted.

4.5. Methodological Limitations

While ballot image auditing provides a powerful tool for identifying issues in the conduction of an election, it is not a substitute for other methods of data collection and examination.²

Ballot image auditing additionally assumes data provenance and good faith engagement from participating jurisdictions. We have no reason to believe any data we received was compromised or otherwise incomplete (and we have substantial evidence that the data we have is correct and complete). However, current voting system technology lacks the ability to provide data integrity guarantees, for instance cryptographic signatures, which limits the ability of auditors to validate the veracity and completeness of data received in this way.

Audit methods that explicitly reference the paper ballots (such as through statistical hand counts, like risk-limiting audits) are essential to providing critical properties like software independence.^{3,4} Nevertheless, the practical constraints around the efficiency and accuracy of hand counting mean that pairing that practice with an image audit enable a more complete audit than is otherwise possible.

² Bernhard, M., Kandula, K., Wink, J., & Halderman, J. A. (2019, September). UnclearBallot: automated ballot image manipulation. In *International Joint Conference on Electronic Voting* (pp. 14-31). Cham: Springer International Publishing.

³ Bernhard, Matthew, Josh Benaloh, J. Alex Halderman, Ronald L. Rivest, Peter YA Ryan, Philip B. Stark, Vanessa Teague, Poorvi L. Vora, and Dan S. Wallach. "Public evidence from secret ballots." In *International Joint Conference on Electronic Voting*, pp. 84-109. Cham: Springer International Publishing, 2017.

⁴ Bernhard, Matthew. "Risk-limiting audits: A practical systematization of knowledge." In *Proc. 6th Int. Joint Conf. Electron. Voting*, pp. 162-177. 2021.

5. Reports by Reference

The following audit system reports are included by reference. These reports are available through the Georgia Secretary of State.

Contest Results Comparison (PDF) – comparison of the ballot count and vote totals for all Federal and State contests

Contest Results Comparison with Jurisdiction Details (PDF) – county-level comparison of the ballot count and vote totals for all Federal and State contests

Contest Results Comparison with County Breakout (XLSX) – county-level comparison of the ballot count and vote totals for all contests

6. Appendix A: OCR Approach

The Enhanced Audit software is the first auditing solution to use optical character recognition (OCR) technology to process and interpret summary ballots. All in-person voting in Georgia produces a Ballot Marking Device (BMD) summary ballot, which contains the voter's selections in human-readable text along with a QR code representing those selections. The voters are instructed to review the human-readable text before placing their ballot into the tabulator. Once the ballot has been placed in the tabulator, the tabulator reads the votes from the QR code and includes them in the count. The audit is intended to tabulate the same ballots using the human readable text and compare those results against the tabulator's results which were computed using the QR codes.

To perform this analysis, the Enhanced Audit software uses OCR technology. First, Enhanced Audit reads the ballot style name printed on the ballot. This ballot style name is then used to look up the list of associated contests for that ballot style. If there are multiple possible ballot style matches, the system takes the one with the highest OCR confidence. If there is an error reading the image or a high level of uncertainty, the ballot is put into a separate list for manual review by the county election official.

Next, the Enhanced Audit system processes ballot style information (precinct identifier), contest titles, and the voter's selections on each page of the summary ballot. The contest title is read using OCR and the system matches the text against the list of possible contests for a given ballot style. Ballots with multiple languages are supported. If the printed contest title cannot be matched to an expected contest, the ballot is put into a separate list for manual review by the county election official.

Then, for each contest, the system processes the text corresponding to the voter's selection to determine the vote that appears on the ballot. The selection text typically includes the selected candidate's name but may also contain text which indicates a blank vote, write-in vote, votes for multiple options, or a yes/no vote. If the selection text cannot be interpreted by the OCR software with high enough confidence, the ballot is put into a separate list for manual review by the county election official. As discussed in a later section, the ballot image may have been of too poor quality for the OCR to determine the voter's selection. This could have been the result of poor print quality, poor scan quality, or both. In these cases, the Enhanced Audit system flags the voter's selection as requiring review by a county election official.

For the ballots in the manual review list, county election officials view the ballot image and determine the voter intent based on the ballot image. Auditors reviewed these changes to ensure consistency with the ballot images.