Voter Signature Verification

June 18, 2025

Presented to the Government Operations Interim Committee

Office of the
State Auditor

OFFICE OF THE UTAH STATE AUDITOR

- The Office of the State Auditor (OSA) has completed a limited review of the certain policies and procedures related as requested.

Audit Leadership:

- Tina M. Cannon, State Auditor
- Alex Nielson, Data Science Manager
- Julie M. Wrigley, Special Projects Director
- Matt Edwards, Special Purpose Senior Auditor
- John Dougall, Prior State Auditor

STARTING POINT

Every system has a weakness.

The purpose of audit is to identify weaknesses and recommend mitigating controls

OFFICE OF THE STATE AUDITOR ACTIONS

Office of the State Auditor (OSA) conducted two separate audits of the signature gathering process

- August - September 2024 Signature Gathering Process
  - Was the process statistically accurate?
  - Was the process reasonable?
- September - December 2024 Fraud Investigation
  - What type and level of fraud was observed?

SCOPE OF STATISTICAL SAMPLE AUDIT

During August and September 2024 OSA conducted a sample audit of signature gathering to determine:

- Whether the signature validation process was reasonable
- If signature validation process yielded statistically-accurate results for candidates for statewide federal and state offices
- Analyzed signatures gathered by:
  - Cox/Henderson campaign
  - Curtis campaign
  - Derek Brown campaign

RESULTS OF SEPTEMBER SAMPLE AUDIT

	Cox/Henderson	Curtis	Brown
Number of validated signatures	28,006	28,006	28,004
Samples reviewed	373	372	372
Number of exceptions noted (Exception race)	4 (1.1%)	3 (0.8%)	5 (1.3%)
Sampled margin of error for full population	±1.0%	±0.9%	±1.2%
Projected number of possible exceptions for full population	300	226	376
Projected number of signatures within uncounted signatures	391	N/A	N/A

Based statistical sampling, and population of uncounted signatures, OSA conclude that it is statistically likely each candidate met statutory thresholds of required valid signatures.

SCOPE OF FRAUD INVESTIGATION AUDIT

- Lt. Governor (LG) and Attorney General (AG) offices' were aware of certain known fraudulent circulators and wanted to identify all of them
  - AG's office was overwhelmed by sheer amount of signatures to review and requested help from the Office of the State Auditor.
- To ensure all potential criminals were identified, OSA performed a manual re-verification of all available signatures

SCOPE OF FRAUD INVESTIGATION AUDIT

- OSA reviewed 301,893 of a possible 304,380 signatures
  - 99.18% of all signatures submitted for validation
  - Only 2,487 of submitted signatures were not reviewed by OSA
- Discrepancy in total signatures because VISTA has three separate signature tables which removed some signatures for various reasons and the LG's Office retained signature packets for existing criminal investigations

FRAUD INVESTIGATION AUDIT METHODS

- Historically, signature reviews required two employees, using VISTA's existing user interface, to review signatures
  - Two reviewers completed ~50 signatures an hour (~ 25/review/hr)
  - 300K signatures would have taken ~1500 employee working days.
- OSA developed a custom software application to optimized the signature review process
  - OSA improved the average signatures reviewed per hour to 250-300
  - OSA completed the project under a tight deadline–10x faster.
  - OSA saved hundreds of thousands of dollars in staffing costs

FRAUD INVESTIGATION AUDIT METHODS

- OSA custom software ensured auditability and transparency
  - Two cameras observed all reviewers
  - Packets were locked behind two restricted doors
  - All reviewer actions were logged and tracked
- With 12 reviewers at a time in a room, able to complete the review of all 300K signatures before December 6th, allowing investigators enough time to start building their fraud cases

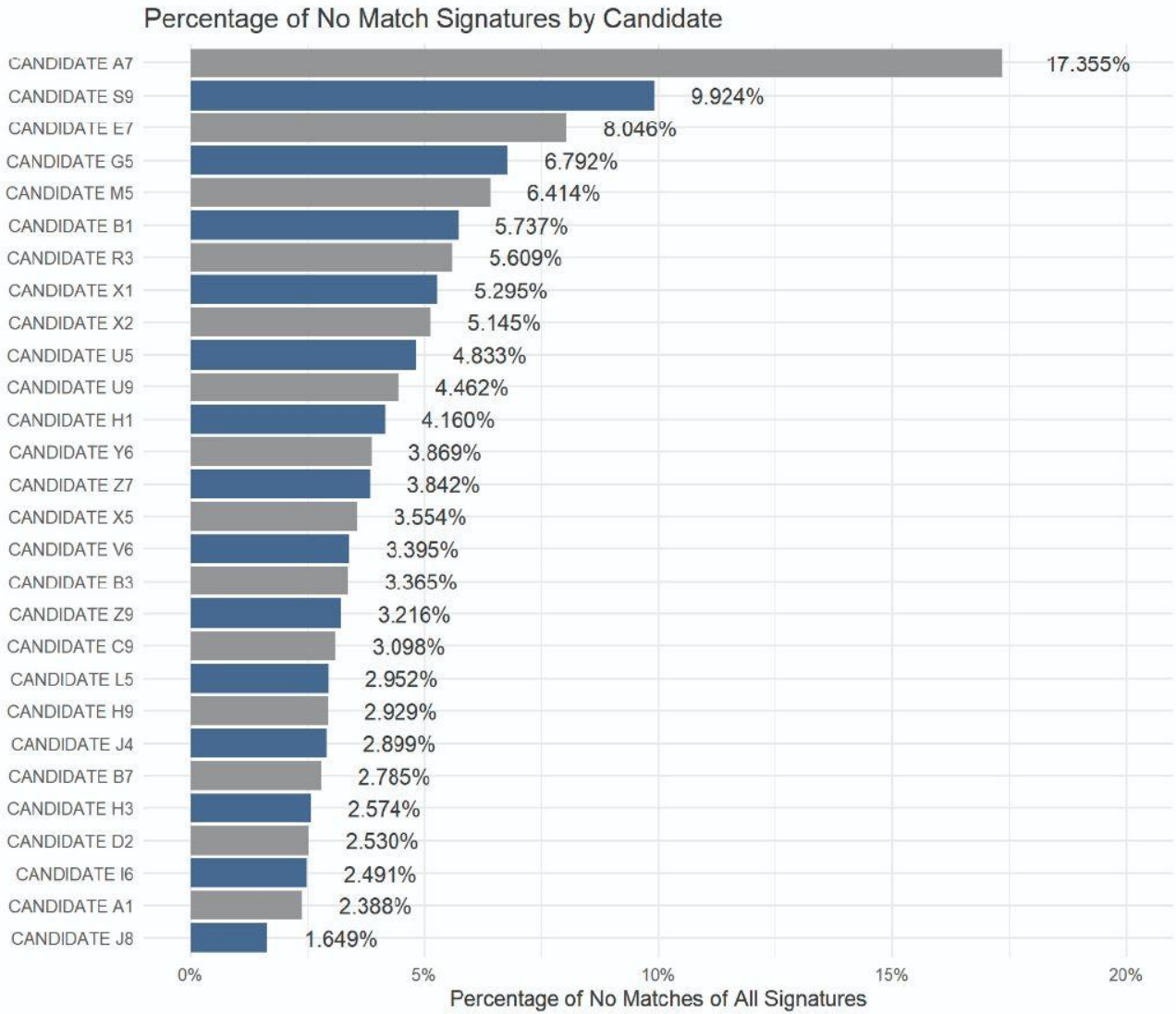
FRAUD INVESTIGATION AUDIT RESULTS

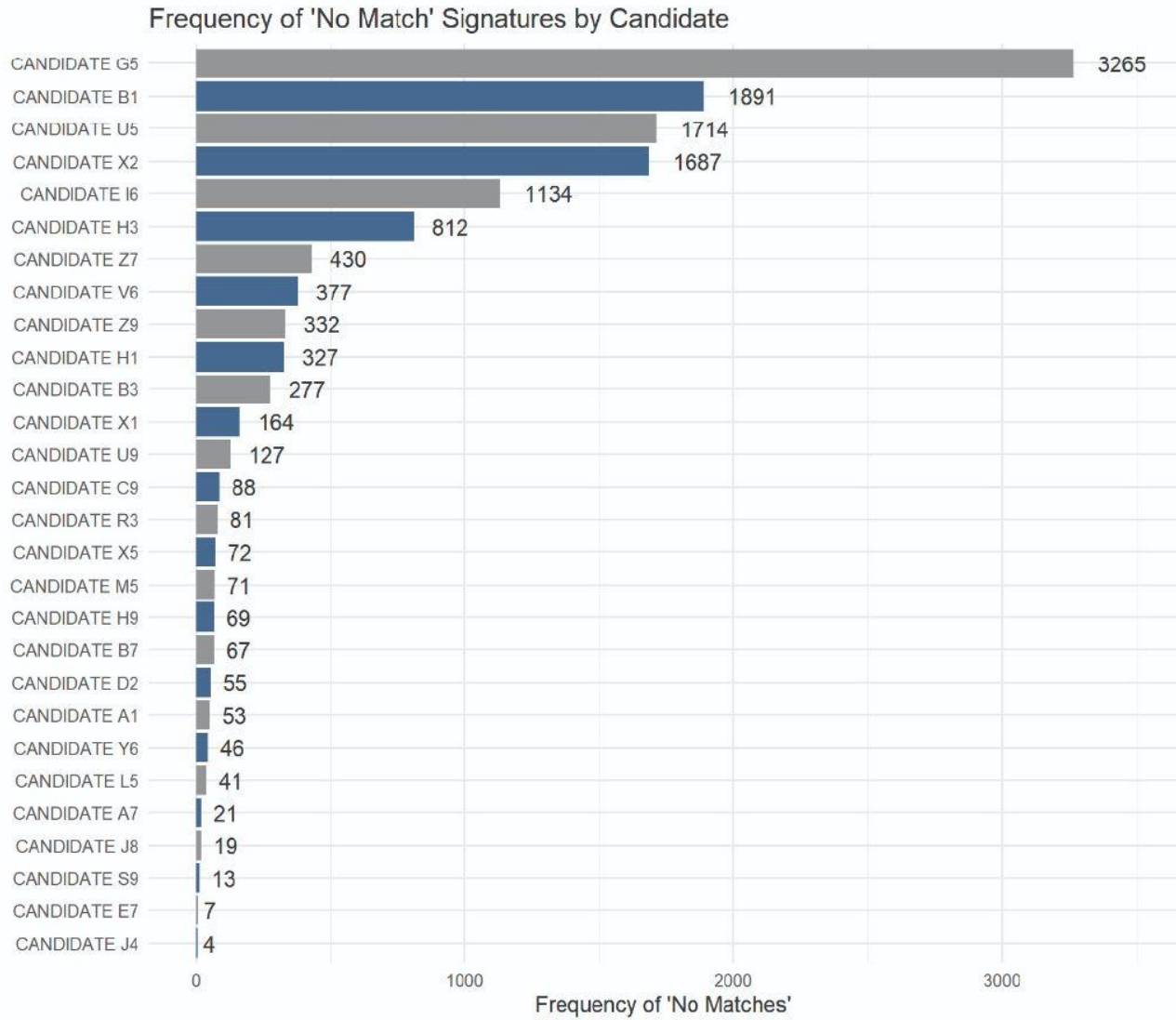
Category	Count	Percentage	Description
Signatures Matched	288,518	95.6%	The signature successfully matched the voter's record.
Signatures Flagged as Potential Fraud	13,258	4.4%	The signature did not match the voter's record.
Total	**301,893**	**100%**	

SIGNATURES FLAGGED AS POTENTIAL FRAUD

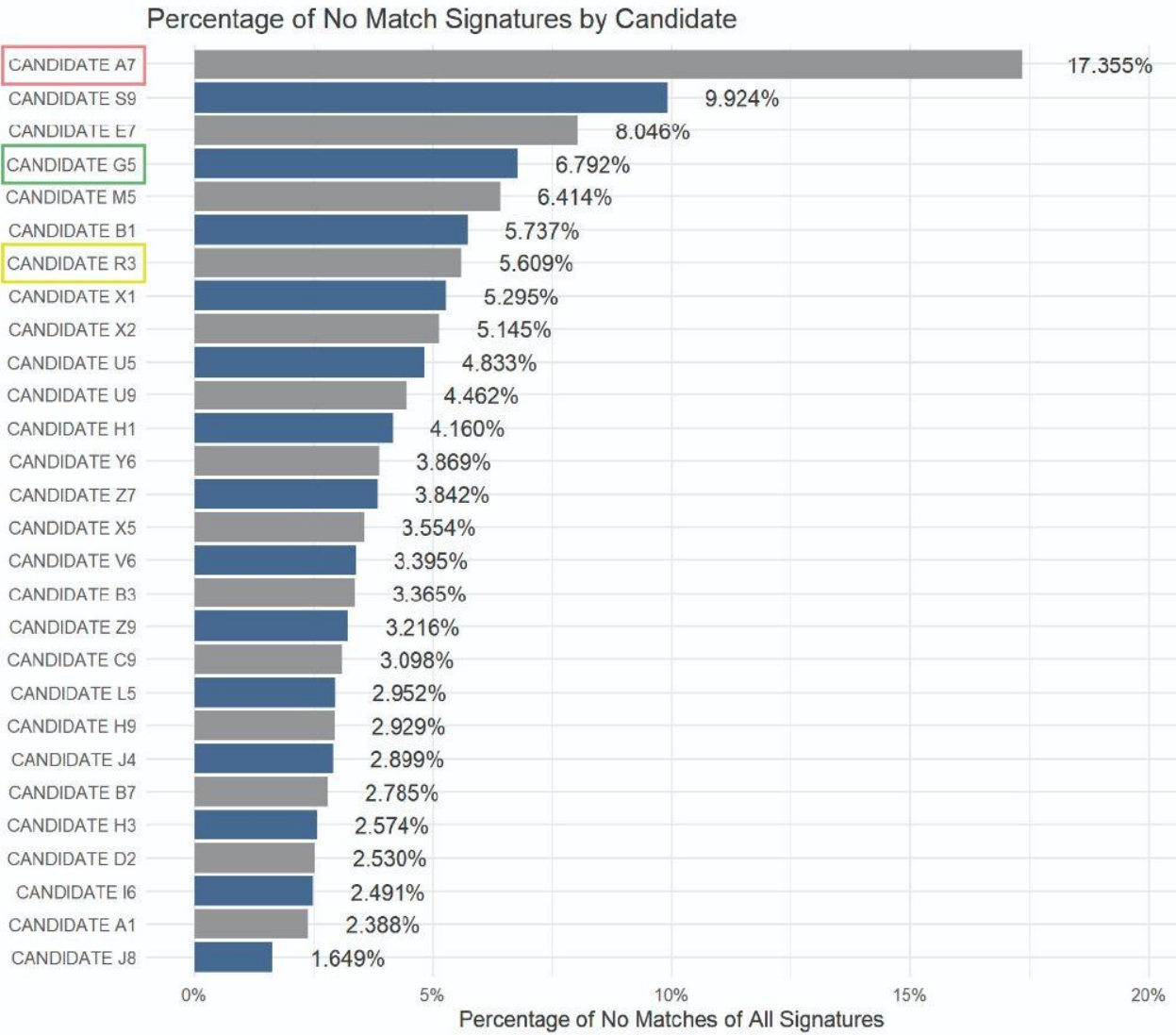
Flagged Category	Count	Percentage	Description
Match Nearby Line	1,781	13.4% (of flagged)	The signature resembled that of a family member, suggesting one person may have signed for multiple household members.
Many Lines	604	4.6% (of flagged)	Multiple lines within a packet exhibited similar handwriting, strongly indicating potential circulator fraud.
Other	277	2.1% (of flagged)	A catch-all for signatures needing more context (e.g., changed name, illegible signature, signs of correction).
Standard No Match	10,596	79.9% (of flagged)	The trained reviewer did not believe the signature matched the voter's record. This is the most common reason for a flag.
Total	**13,258**	**100%**	**Signatures Flagged as Potential Fraud**

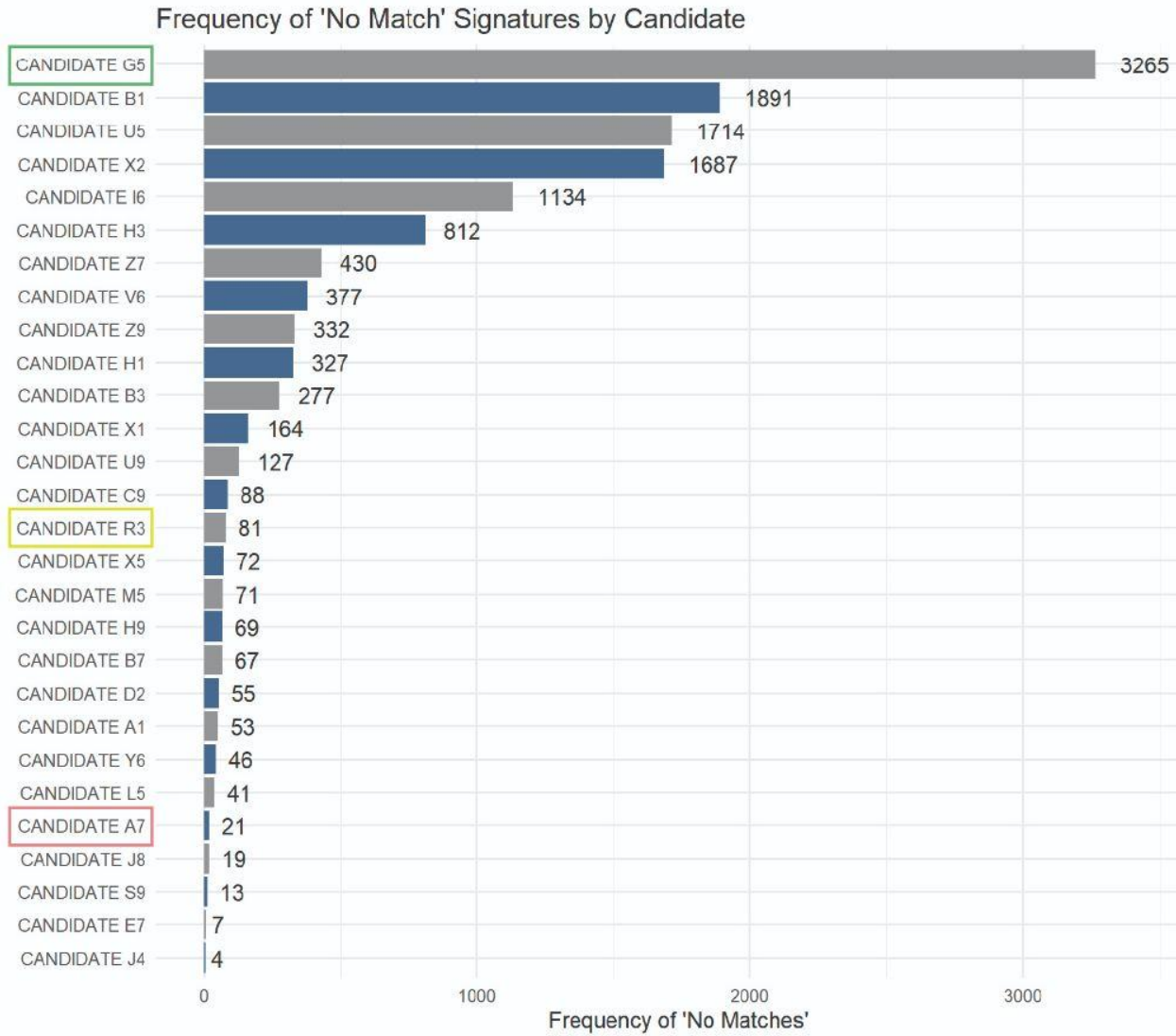
DIFFERENCES BETWEEN CANDIDATES





DIFFERENCES BETWEEN CANDIDATES





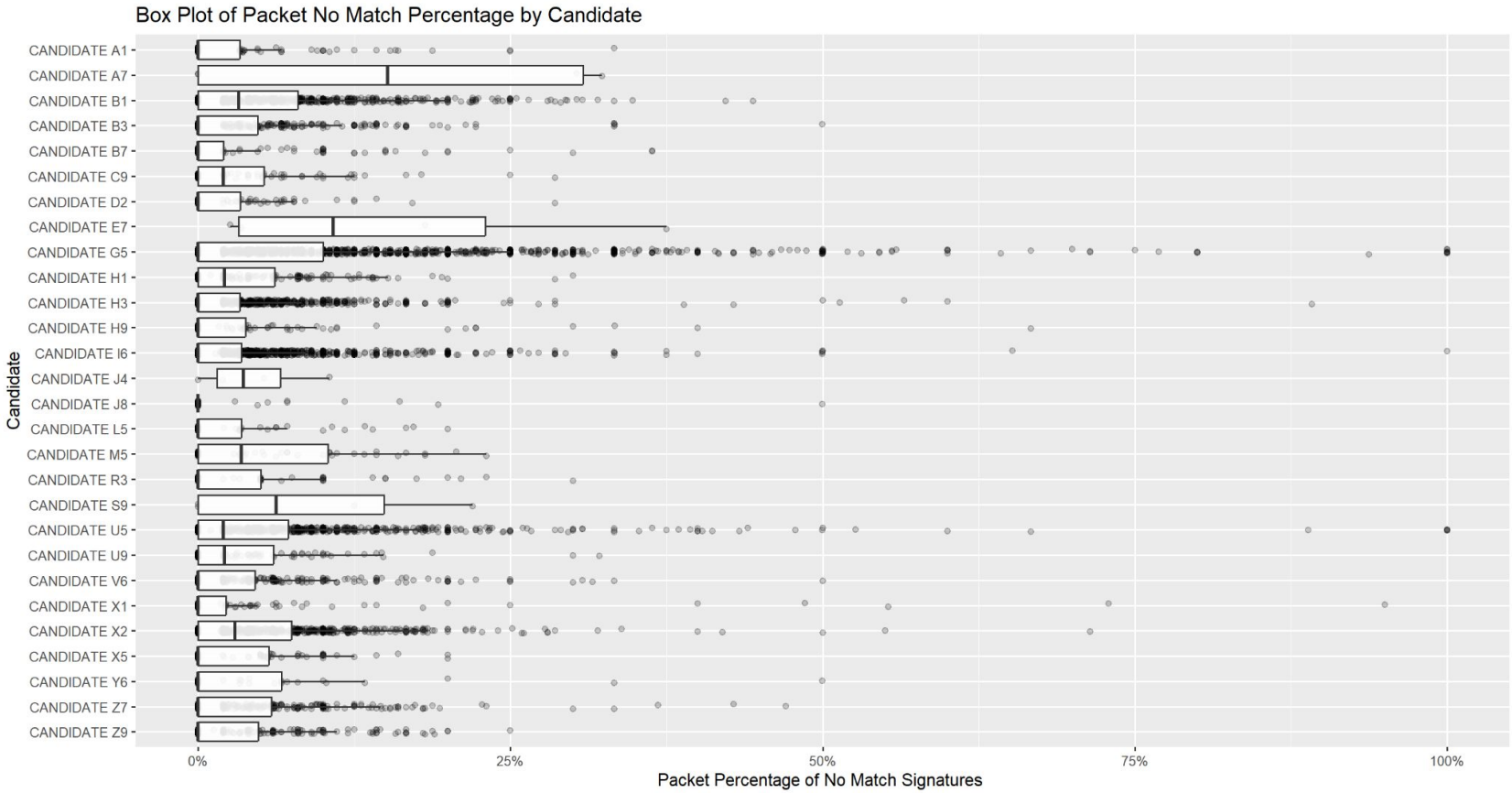
DISTRIBUTION OF PACKET "NO MATCH" RATE

A box plot provides a summary of the distribution of a Packets' "No Match" Rate by Candidate:

- The white box represents the middle half of Packets.
- The dark black bar in the white square is the median (average)
- The black dots represent packets percent of no match signatures

Insights:

- The majority of packets have little to none non-matching signatures
- Some packets have significantly more than average non matching
- The distribution varies by candidate



TINA M. CANNON
UTAH STATE AUDITOR

ERROR RATE CALCULATION

Observation

- Error rates differ significantly both between candidates and races
- Based on the full review of the more than 300K signatures, OSA was able to calculate an error rate that can be applied to ensure correct validation of statutory required number of signatures
- Incorrectly Validated Signatures: 1.38% - 5.92%
  (depending on candidate - see next slide)

Recommendation

- IF 28K signatures THEN validate an additional 1500 signatures or 6%
- IF < 28K signatures THEN validate an additional 200 signatures or 10%

ERROR RATE CALCULATION

Candidate	Valid	No Match	Error Rate
CANDIDATE U5	1013	60	5.92%
CANDIDATE J7	27642	1328	4.80%
CANDIDATE R6	1000	43	4.30%
CANDIDATE J4	27957	1114	3.98%
CANDIDATE K0	27763	895	3.22%
CANDIDATE G3	7020	225	3.21%
CANDIDATE E8	2002	64	3.20%
CANDIDATE O5	20772	658	3.17%
CANDIDATE A0	6953	204	2.93%
CANDIDATE X4	1689	42	2.49%
CANDIDATE W5	81	2	2.47%
CANDIDATE Y6	1002	24	2.40%
CANDIDATE F4	1980	47	2.37%
CANDIDATE X8	6956	160	2.30%

Candidate	Valid	No Match	Error Rate
CANDIDATE Z0	6996	158	2.26%
CANDIDATE F4	980	22	2.24%
CANDIDATE J4	5131	114	2.22%
CANDIDATE G2	97	2	2.06%
CANDIDATE S7	6955	141	2.03%
CANDIDATE Y6	1939	39	2.01%
CANDIDATE U7	1993	38	1.91%
CANDIDATE R7	1995	38	1.90%
CANDIDATE M5	27837	525	1.89%
CANDIDATE F1	1546	29	1.88%
CANDIDATE J3	2019	36	1.78%
CANDIDATE B7	28247	498	1.76%
CANDIDATE D4	1011	14	1.38%

REVIEW CHALLENGE: SIGNATURE QUALITY

- Signature verification is dependent on signature quality.
- DMV electronic signatures lack pen stroke detail and are often less readable than paper signatures that are later scanned
- Impacts not just candidate petitions, but also official voting ballots since the same signatures are used in both processes

RECOMMENDATIONS

- Circulator TRACKING & TRAINING
  - Improve process and/or reverify signatures of known fraudulent circulators
  - Certified circulator training from the LG's office
- Data Entry
  - Create robust data entry to avoid human error

TAKEAWAY 2: CIRCULATOR TRACKING & TRAINING

- Circulator information is not detailed at a database level
  - Often the only associated information is circulator name
- Circulator naming inconsistencies
  - VISTA should improve circulator identity record linkage
- Circulator record linkage could allow LG's office to track circulators and their associated valid/invalid trends
- Circulators with above average invalidation rate could be investigated (in real-time) rather than after the fact
- Elections Office could provide circulator certification and training to ensure understanding and regulatory compliance

INCONSISTENT CIRCULATOR NAMING ISSUES

- Not Detailed: “A” , “BULL”, “DAVIS”, “HEU”, “R”, “WILL G”
- Typos:

FIRST NAME	LAST NAME
KELVIN	MBAGO
KELVIN	MBOGO
KELVIN	MBOYO
KELVIN	MOGGO
KEVIN	MBAGO

CIRCULATOR TRAINING

The LGs office could create and require online circulator training that covers what counts as fraud, and let the circulators know they are being actively monitored for forged signatures

TAKEAWAY 3: DATA ENTRY ERRORS

Observation:

- Humans make mistakes typing/entering information
  - UNSOLVABLE!
  - Examples on next slides

Recommendation:

- Require 2 people two enter all information. If the entered information does not match, it should require re entry by a third reviewer to tie break.

PACKET ID ERRORS

Observations:

- Mismatches occured between physical packet ID and database packet ID
- Examples:
  - Packett 128 entered as 126
  - Packet 333 entered as 3333
- Frequency: Dozens of Packets
- Impact: Confusion over packet reverification, circulator, etc.

INCORRECT CANDIDATE ASSOCIATION

Observations:

- Validated Signatures for one candidate were applied incorrectly to another candidate.
- Example: One of Candidate A's packets had all validated signatures being counted as Candidate B's due to incorrect packet association.
- Frequency: Rare - only three identified instances.
- Impact: Incorrect tally of signatures

INCORRECT VOTER SELECTED

Observations:

- Voter Names on the packet did not match database voter information - though address did match. Likely Caused by selecting incorrect voter at an address.
- Example: “Alexander Nielson - 1234 North Temple” and “Jimmy Johnson - 1234 North Temple”
- Frequency: Hundreds of occurrences
- Impact: Incorrect voter’s vote applied to a petition. False invalidation/validation.

TAKEAWAY 4: BETWEEN-REVIEWER RELIABILITY

- Signature Matching is inherently a subjective review - subjectivity is mitigated by following prior agreed upon standards and methods.
  - Training provides these, but lack of follow up or re-evaluation of how reviewers evaluate signatures allow standards degradation
- Some reviewers are faster or slower than others
  - LG office should evaluate the effective rates at which reviewers consistently agree about signatures matching/non-matching

TAKEAWAY 4: BETWEEN-REVIEWER RELIABILITY

- Regular signature reviewer reliability checks should be performed
  - OSA can assist with error rates and reliability metrics
- This is referred to as “Intercoder Reliability” or “Inter-rater Agreement” in academic literature, and various statistical methods exist to evaluate these metrics.
- Example Cohen's Kappa: Widely used statistic for assessing inter-rater agreement between two raters when dealing with categorical and/or boolean data. It accounts for agreements expected by chance. Interpretation guidelines for Kappa values exist to categorize the strength of agreement (e.g., slight, fair, moderate, substantial, almost perfect).

TAKEAWAY 5: VISTA AUDIT TRAIL

Observations:

- When the LG's office identified fraudulent packet(s), they removed that packet and associated signatures from the database to avoid counting any prior validated signatures to the count threshold.
- While removed signatures should certainly not be included towards the candidate count threshold, these records should not be removed entirely from the database.

TAKEAWAY 5: VISTA AUDIT TRAIL

Recommendations:

- VISTA Database administrators should:
  - Create "quarantined" or "suspected fraud" table for signatures and packets.
  - Create field(s) on the packet table, such as "fraud," to identify such packets
  - Ensure clear logging of all cases and detailed reasoning. These logs should not be deletable by the DTS employees who manage the VISTA database and should be managed by a trusted external DTS team.
  - Enforce Privileged Access Management (PAM). The database administrator should create special roles for the above process that can only be approved by non Database Administrators (DBA) such as the LG or Director of Elections.