

**IN THE UNITED STATES DISTRICT COURT FOR  
THE NORTHERN DISTRICT OF GEORGIA  
ATLANTA DIVISION**

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**DONNA CURLING, et al.**

**Plaintiff,**

**vs.**

**BRAD RAFFENSPERGER, et al.**

**Defendant.**

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**CIVIL ACTION FILE NO.:  
1:17-cv-2989-AT**

**DECLARATION OF PHILIP B. STARK**

**PHILIP B. STARK** hereby declares as follows:

1. This statement supplements my declarations of September 9, 2018; September 30, 2018; October 22, 2019; December 16, 2019; August 23, 2020; August 31, 2020; September 13, 2020; and August 2, 2021. I stand by everything in the previous declarations and incorporate them by reference. *This declaration includes and augments a declaration submitted on 11 January 2022. Aside from adding the italicized material in this paragraph and correcting minor typographical errors, the differences between the previous version and this version are confined to (new) paragraphs 58 through 84. Paragraphs 85 through 89 were in the earlier version but have been renumbered. Appendix 1 has been updated to the current version of my CV. Appendices 2, 3, and 4 are unchanged. Appendices 5 through 9 are new.*

## Qualifications and Background

2. I am Professor of Statistics at the University of California, Berkeley, where I am also a faculty member in the Graduate Program in Computational Data Science and Engineering; a co-investigator at the Berkeley Institute for Data Science; principal investigator of the Consortium for Data Analytics in Risk; director of Berkeley Open Source Food; and affiliated faculty of the Simons Institute for the Theory of Computing, the Theoretical Astrophysics Center, and the Berkeley Food Institute. Previously, I was Associate Dean of Mathematical and Physical Sciences, Interim Regional Associate for the College of Chemistry and the Division of Mathematical and Physical Sciences, Chair of the Department of Statistics, and Director of the Statistical Computing Facility.
3. I have published more than two hundred articles and books. I have served on the editorial boards of archival journals in physical science, Applied Mathematics, Computer Science, and Statistics. I currently serve on three editorial boards. I have lectured at universities, professional societies, and government agencies in thirty countries. I was a Presidential Young Investigator and a Miller Research Professor. I received the U.C. Berkeley Chancellor's Award for Research in the Public Interest, the Leamer-Rosenthal Prize for Open Social Science, and a Velux/Villum Foundation Professorship. I am a member of the Institute for Mathematical Statistics and the Bernoulli Society. I am a Fellow of the American Statistical Association, the Institute of Physics, and the Royal Astronomical Society. I am professionally accredited as a statistician by the American Statistical Association and as a physicist by the Institute of Physics.

4. I have consulted for many government agencies, including the U.S. Department of Justice, the U.S. Department of Agriculture, the U.S. Department of Commerce, the U.S. Department of Housing and Urban Development, the U.S. Department of Veterans Affairs, the Federal Trade Commission, the California Secretary of State, the California Attorney General, the California Highway Patrol, the Colorado Secretary of State, the Georgia Department of Law, the Illinois State Attorney, the New Hampshire Attorney General, and the New Hampshire Secretary of State. I currently serve on the Board of Advisors of the U.S. Election Assistance Commission and its Cybersecurity Subcommittee. (The opinions expressed herein are, however, my own: I am not writing as a representative of any entity.)
5. I have testified before the U.S. House of Representatives Subcommittee on the Census; the State of California Senate Committee on Elections, Reapportionment and Constitutional Amendments; the State of California Assembly Committee on Elections and Redistricting; the State of California Senate Committee on Natural Resources; and the State of California Little Hoover Commission.
6. I have been an expert witness or non-testifying expert in a variety of state and federal cases, for plaintiffs and for defendants, in criminal matters and a range of civil matters, including, *inter alia*: truth in advertising, antitrust, construction defects, consumer class actions, credit risk, disaster relief, elections, employment discrimination, environmental protection, equal protection, fairness in lending, federal legislation, First Amendment, import restrictions, insurance, intellectual property, jury selection, mortgage-backed securities, natural resources, product liability class actions, *qui tam*,

risk assessment, toxic tort class actions, trade secrets, utilities, and wage and hour class actions.

7. I have been qualified as an expert on statistics in federal courts, including the Central District of California, the Northern District of Georgia, the District of Maryland, the Southern District of New York, and the Eastern District of Pennsylvania.
8. I have also been qualified as an expert on statistics in state courts.
9. I have used statistics to address a wide range of questions in many fields.<sup>1</sup>
10. I served on former California Secretary of State Debra Bowen's Post-Election Audit Standards Working Group in 2007.
11. In 2007, I invented a statistical approach to auditing elections ("risk-limiting audits," referred to below as "RLAs") that has been incorporated into statutes in California (AB 2023, SB 360, AB 44), Colorado (C.R.S. 1-7-515), Rhode Island (RI Gen L §17-19-37.4 (2017)), Virginia (Code of Virginia 24.2-671.1), and Washington (RCW 29A.60.185), and which are in pending federal legislation (the PAVE Act of 2018 and S.1 of 2021). My election auditing methods have been used in roughly 20 U.S. States and in Denmark. (The State of Georgia has piloted some RLA procedures, but has not conducted an actual RLA, as I explain below.)
12. RLAs are widely viewed as the best way to check whether the reported winner(s) of an election really won. They have been endorsed by the Presidential Commission on

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<sup>1</sup> For example, I have used statistics to analyze the Big Bang, the interior structure of the Earth and Sun, earthquake risk, the reliability of clinical trials, the accuracy of election results, the accuracy of the U.S. Census, the risk of consumer credit default, food safety, the causes of geriatric hearing loss, the effectiveness of water treatment, sequestration of carbon in agricultural soils, the fragility of ecological food webs, risks to protected species, the effectiveness of Internet content filters, high-energy particle physics data, and the reliability of models of climate, among other things.

Election Administration; the U.S. National Academies of Sciences, Engineering, and Medicine; the American Statistical Association; the League of Women Voters; Verified Voting Foundation; Citizens for Election Integrity Minnesota; and other groups concerned with election integrity.

13. I have worked closely with state and local election officials in California and Colorado to pilot and deploy RLAs. The software Colorado uses to conduct RLAs is based on software I wrote. All of the genuinely risk-limiting methods in VotingWorks “Arlo” software used by the State of Georgia were invented by me.<sup>2</sup>
14. I worked with Travis County, Texas, on the design of STAR-Vote, an end-to-end cryptographically verifiable voting system.
15. I testified as an expert witness in the general area of election integrity, including the reliability of voting equipment, in 2016 presidential candidate Jill Stein’s recount suit in Wisconsin, and filed a report in her suit in Michigan.
16. I have testified as an expert in election auditing and the accuracy of election results in two election-related lawsuits in California.
17. I have testified to both houses of the California legislature regarding election integrity and election audits. I have testified to the California Little Hoover Commission about election integrity, voting equipment, and election audits.
18. I have advised the election commissions of Denmark, Mongolia, and Nigeria on issues related to election integrity, security, and audits.

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<sup>2</sup> Arlo also implements a method that is not risk-limiting in practice.

19. I was a member of the three-person team that conducted a statutory forensic audit of the State Representative contest in Windham, NH, in 2021.<sup>3</sup>
20. Since 1988, I have taught statistics at the University of California, Berkeley, one of the top two statistics departments in the world (see, e.g., QS World University Rankings, 2014) and the nation (US News and World Reports, 2018). I teach statistics regularly at the undergraduate and graduate levels. I have created five new statistics courses at Berkeley. I developed and taught U.C. Berkeley's first for-credit online course in any subject, and among the first approved for credit throughout the ten campuses of the University of California system. I also developed and co-taught online statistics courses to over 52,000 students, using an online textbook and other pedagogical materials I wrote and programmed.
21. Appendix 1 is my current *curriculum vitae*, which includes my publications for the last ten years and all cases in the last four years in which I gave deposition or trial testimony.

## Opinions

22. I have been asked to assess whether the State of Georgia's current Dominion Ballot Marking Device ("BMD") voting system and the protocols for its use—including audits—provides reasonable assurance that voters' selections will be counted, and counted as cast. The answer is a clear "no."

## **The 2020 "Audit"**

23. Georgia Secretary of State Brad Raffensperger has claimed, referring to the post-election audit of the November 3, 2020 presidential contest, "Georgia's historic first

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<sup>3</sup> See <https://www.doj.nh.gov/sb43/index.htm>, last accessed 8 January 2022.

statewide audit reaffirmed that the state’s new secure paper ballot voting system accurately counted and reported results.”<sup>4</sup> And “[] we did a 100 percent risk-limiting audit with a hand recount which proved the accuracy of the count and also proved that the machines were accurately counting it, and that no votes were flipped.”<sup>5</sup>

VotingWorks Executive Director Ben Adida claimed “Georgia’s first statewide audit successfully confirmed the winner of the chosen contest and should give voters increased confidence in the results.”<sup>6</sup> Per the official report of the audit, “The audit confirmed the original result of the election, namely that Joe Biden won the Presidential Contest in the State of Georgia. The audit [] provides sufficient evidence that the correct winner was reported.”<sup>7</sup> I shall explain why these claims about the audit are false.

24. There are many things the audit did not check (including the outcome), and the thing it was positioned to check—the tabulation of validly cast ballots—was not checked properly, as data from the audit itself show.

25. I shall start by listing some things the audit did not check. My statements are true and correct to the best of my knowledge, and they are consistent with the audit documentation available at the Secretary of State’s website at the URL [https://sos.ga.gov/index.php/elections/2020\\_general\\_election\\_risk-limiting\\_audit](https://sos.ga.gov/index.php/elections/2020_general_election_risk-limiting_audit) (last accessed 9 January 2022).

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<sup>4</sup>[https://sos.ga.gov/index.php/elections/historic\\_first\\_statewide\\_audit\\_of\\_paper\\_ballots\\_upholds\\_result\\_of\\_presidential\\_race](https://sos.ga.gov/index.php/elections/historic_first_statewide_audit_of_paper_ballots_upholds_result_of_presidential_race), last accessed 9 January 2022

<sup>5</sup> <https://www.effinghamherald.net/local/raffensperger-spread-election-misinformation-bipartisan-endeavor/> last accessed 9 January 2022.

<sup>6</sup> Ibid.

<sup>7</sup> [https://sos.ga.gov/admin/uploads/11.19\\_20\\_Risk\\_Limiting\\_Audit\\_Report\\_Memo\\_1.pdf](https://sos.ga.gov/admin/uploads/11.19_20_Risk_Limiting_Audit_Report_Memo_1.pdf). last accessed 9 January 2022

26. The audit did not check whether BMDs correctly printed voters' selections. No audit can check that, as I have previously declared. (As a consequence, Secretary Raffensperger has no basis to assert that no votes were flipped.) The declarations and testimony of Prof. J. Alex Halderman establish that BMDs can be hacked, misprogrammed, or misconfigured to print votes that differ from voters' selections as confirmed onscreen or through audio. As Prof. Andrew Appel has testified and as elaborated in my declarations, only voters are in a position to check—but few do, and those who do check generally check poorly. To the best of my knowledge, the State of Georgia has no procedures in place to log, investigate, or report complaints from voters that BMDs altered votes, so it is not clear whether any voters did notice problems. My previous declarations also explain why logic and accuracy testing can never be adequate to establish that BMDs behave correctly in practice.<sup>8</sup>
27. The audit did not check whether every validly cast ballot was scanned exactly once. The audit could not check whether every validly cast ballot was scanned, because Georgia's rules for ballot accounting, pollbook and voter participation reconciliation, physical chain of custody, etc., are not adequate to ensure that every cast ballot is accounted for.
28. The audit did not check whether every memory card used in the election was accounted for, nor whether every memory card containing votes was uploaded to a

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<sup>8</sup> See, e.g., Stark, P.B. and R. Xie, 2019. Testing Cannot Tell Whether Ballot-Marking Devices Alter Election Outcomes, ArXiv, <https://arxiv.org/abs/1908.08144>, last accessed 9 January 2022.



tabulator. The audit found that some had not been,<sup>9</sup> but to my knowledge, there has been no check to confirm there are no other cards with votes outstanding.

29. The audit did not check whether any scans were duplicated, deleted, replaced or altered.
30. The audit did not check whether QR code encoding the votes on BMD printout matches the human-readable selections on any ballot.
31. The audit did not check whether the voting system correctly interpreted any ballot or BMD printout. (Again, as a consequence, Secretary Raffensperger has no basis to assert that no votes were flipped.)
32. The audit did not do a very good job of checking the tabulation, as I shall demonstrate. I focus on Fulton County. I have not investigated other counties, but I have no reason to believe the problems and errors are confined to Fulton County. I have been told by Coalition Plaintiffs that similar problems occurred in other counties, but I have not independently verified their findings.
33. I downloaded the detailed “audit spreadsheet” from the URL <https://sos.ga.gov/admin/uploads/audit-report-November-3-2020-General-Election-2020-11-19.csv> on 9 January 2022.
34. I downloaded images of the Fulton County RLA manual tabulation batch sheets (“Audit Board Batch Sheets”, ABBSs henceforth) from <https://sos.ga.gov/admin/uploads/Fulton%20RLA%20Batches.zip> on 9 January 2022. That file contains five .pdf files, “Fulton Audit Documents 1\_redacted.pdf,” through “Fulton Audit Documents 4\_redacted.pdf,” which contain images of ABBSs, and

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<sup>9</sup> See notes 13 and 14, *infra*.

“Fulton Audit Documents 5.pdf” which contains images of “Vote Review Panel Tally Sheets.”

35. My understanding is that ABBSs are filled in by hand by the counting teams who counted the votes from the paper ballots (including BMD printout). Each ABBS reflects the manual tally of votes from one physically identifiable batch of ballots. I understand that after the ABBSs were filled out, other workers transcribed data from the ABBSs into VotingWorks audit software “Arlo.” My understanding is that every ballot validly cast in Fulton County in the 2020 Presidential Election should be reflected in exactly one ABBS, and data from every ABBS should have been entered exactly once into the database from which the audit spreadsheet was exported.
36. The four ABBS image files contain 349 pages, 636 pages, 578 pages, and 364 pages, respectively, a total of 1,927 ABBSs. But the audit spreadsheet contains only 1,916 rows of data for Fulton County. It appears that at least eleven ABBSs are entirely missing, not counting possible duplicate entries in the spreadsheet.<sup>10</sup> This sort of “sanity check” is simple to perform, but apparently was not performed by the auditors, the County, or the Secretary of State.
37. Many ABBSs were not completely filled in. The “Batch Type,” signifying the mode of voting (absentee, election day, advance) was often blank, and many numbers were blank, presumably intended to denote zeros.

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<sup>10</sup> However, I did see at least one ABBS marked “Dup” (presumably meaning “duplicate”) for instance, page 11 of “Fulton Audit Documents 2\_redacted.pdf.” However, as the table after paragraph 38, *supra*, shows, there are at least 11 ABBSs that are not accounted for in the audit spreadsheet. Thus, there are presumably duplicated entries in the audit spreadsheet.

38. Coalition Plaintiffs have identified a sample of at least eleven ABBSs for Fulton County that do not appear in the audit spreadsheet, and I have verified their work. The software I wrote for that purpose is in Appendix 2.

39. The following table lists these examples; the final column indicates which page of which ABBS image file contains the image (for instance, “4 at 162” means page 162 of “Fulton Audit Documents 4\_redacted”). The fact that the vote data in the last two rows are identical is suspicious, but the corresponding ABBS images are clearly different; see Appendix 3. Regardless, neither appears in the audit spreadsheet.

	Scanner	Batch	Mode of voting	Trump	Biden	Jorgensen	Write-In	Undervote or blank	Overvote	Image source
1	3	48	absentee	4	93	2	0	0	0	4 at 162
2	2	52	absentee	6	92	0	0	0	0	1 at 1
3	3	12–14	?	12	83	1	0	0	0	4 at 128
4	3	239	?	13	87	0	0	0	0	3 at 177
5	1	80–84	?	118	329	3	2	2	1	3 at 519
6	3	260	absentee	30	66	0	0	0	0	4 at 355
7		AP01A-1	election day	84	62	6	2	1	0	1 at 170
8	3	179–181	absentee	85	224	5	1	2	0	4 at 293
9	2	239	absentee	4	42	0	0	0	0	2 at 153
10	Chastain	12	advance	613	605	24	7	4	0	3 at 351
11	Chastain	114	advance	613	605	24	?	4	0	3 at 270

40. I searched the audit spreadsheet for tallies that matched the numbers in these missing ABBSs. There are no data in the audit spreadsheet matching rows 4–11 of the table. There are data that match rows 1, 2, and 3, but with distinctively different batch identifiers.<sup>11</sup> It is plausible that these are genuinely different batches, and I have no reason to believe otherwise: some identical counts in different batches are to be

<sup>11</sup> The data that match row 1 are identified as “Scanner 3 Ballot [sic] 162” rather than batch 48. The data that match row 2 are identified as “Absentee Scanner 2 Batch 400” rather than batch 52. The data that match row 3 are identified as Absentee Scanner 3 Batch 253 rather than batches 12–14.

expected. Indeed, in the entire audit spreadsheet, there are 16,807 rows that duplicate other ABBS vote counts within the same county, out of a total of 41,881 rows.

41. I checked vote totals for Donald J. Trump, Joseph R. Biden, and Jo Jorgensen derived by summing ABBS entries in the audit spreadsheet against the vote totals in the summary audit result spreadsheet posted by the Secretary of State at the URL <https://sos.ga.gov/admin/uploads/Georgia%202020%20RLA%20Report.xlsx>, which I downloaded on 9 January 2022. (The spreadsheet does not list write-ins, undervotes, or overvotes.) Both show Trump receiving 137,620 votes, Biden receiving 381,179, and Jorgensen receiving 6,494. Thus, the ABBSs that are missing from the audit spreadsheet are also missing from the audit's reported vote totals.
42. On the assumption that the ABBSs—the original source of the manual tally data entered into the audit spreadsheet—are correct, the omission of that sample of 11 ABBSs deprived Trump of 1,582 votes, Biden of 2,288, and Jorgensen of 65, not to mention write-ins. This sample alone has a total of over 3,900 votes that the audit tabulated but were not included in the audit's reported vote totals.
43. The original tabulation in Fulton County showed 524,659 votes; the reported audit results showed 525,293, a difference of 634 votes, about 0.12 percent.<sup>12</sup> Accounting for those 11 omitted ABBSs increases the apparent error of the first count from 634 votes to over 4,569 votes or 0.87 percent, far larger than the statewide margin of

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<sup>12</sup> Data from <https://sos.ga.gov/admin/uploads/Georgia%202020%20RLA%20Report.xlsx>, last accessed 9 January 2022.

victory. It is also larger than 0.73 percent, which Secretary of State Raffensperger claimed was the maximum miscount in any Georgia county.<sup>13</sup>

44. However, there is no way to know whether including that sample of 11 ABBSs would make the audit tabulation a complete count of the votes in Fulton County. That is because Georgia's canvass is inadequate: many ballots might still remain untabulated. The proof that at least some of Georgia's jurisdictions do not keep adequate track of ballots, memory cards, and other election materials is reflected in the fact that thousands of ballots and scans were "discovered" during the audit.<sup>14</sup> There is no trustworthy inventory of ballots to check the results against, because of Georgia's lax canvass.
45. Governor Brian P. Kemp has pointed out similar flaws in the audit, saying the audit report was "sloppy, inconsistent, and presents questions about what processes were used by Fulton County to arrive at the result."<sup>15</sup> Governor Kemp's letter points out that

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<sup>13</sup> Per Secretary Raffensperger, "[i]n Georgia's recount, the highest error rate in any county recount was 0.73%." [https://sos.ga.gov/index.php/elections/2020\\_general\\_election\\_risk-limiting\\_audit](https://sos.ga.gov/index.php/elections/2020_general_election_risk-limiting_audit), last accessed 9 January 2022.

<sup>14</sup> [https://www.cbs46.com/news/floyd-county-election-director-fired-after-audit-reveals-2-600-votes-went-uncounted/article\\_bbd08d90-2aa2-11eb-9e4d-bf96ac56ad54.html](https://www.cbs46.com/news/floyd-county-election-director-fired-after-audit-reveals-2-600-votes-went-uncounted/article_bbd08d90-2aa2-11eb-9e4d-bf96ac56ad54.html), last accessed 10 January 2022. <https://www.news4jax.com/news/georgia/2020/11/18/4th-georgia-county-finds-uncounted-votes-as-hand-count-deadline-approaches/>, last accessed 10 January 2022. [https://www.mdjonline.com/elections/cobb-elections-finds-350-uncounted-ballots-during-audit/article\\_0d93e26e-22bd-11eb-8bce-17067aceee33.html](https://www.mdjonline.com/elections/cobb-elections-finds-350-uncounted-ballots-during-audit/article_0d93e26e-22bd-11eb-8bce-17067aceee33.html), last accessed 10 January 2022. <https://www.11alive.com/article/news/politics/elections/fayette-county-election-results-ballots-uncovered-during-audit/85-f79dd838-a15c-4407-80b2-9dfbc2466188>, last accessed 10 January 2022.

<sup>15</sup> Letter from Brian P. Kemp, Governor, to the Georgia State Election Board, dated 17 November 2021, addressing the work of Mr. Joseph Rossi; Review of Inconsistencies in the Data Supporting the Risk Limiting Audit Report, Office of Governor Brian P. Kemp, 17 November 2021. These documents are attached hereto as Appendix 4.

the audit data include duplicated entries, which I understand Coalition Plaintiffs have verified. I have not tried to verify those findings.

### **First Count, Audit, and Recount Differ Substantially**

46. I understand that Plaintiff Donna Curling votes in Fulton County precinct RW01. On 10 January 2022, I downloaded the official precinct-level results for the original tabulation from

<https://results.enr.clarityelections.com//GA/Fulton/105430/271723/reports/detailxls.zip> and for the recount from

<https://results.enr.clarityelections.com//GA/Fulton/107292/275183/reports/detailxls.zip> to examine the results in that precinct.

47. The following table shows the counts of election-day votes in Fulton County precinct RW01 for the three presidential candidates, according to the original machine count, the machine recount, and the “audit,” and vote-by-mail and advance votes for the original election and the recount. (The audit did not report precinct-level results for vote-by-mail or advance voting.)

Count	Election Day			Advance			Absentee by Mail			Provisional		
	Trump	Biden	Jorgensen	Trump	Biden	Jorgensen	Trump	Biden	Jorgensen	Trump	Biden	Jorgensen
Original	193	88	11	1455	1003	23	619	833	15	9	4	1
Recount	162	73	9	1487	1015	25	619	809	15	5	3	1
Audit	243	88	11									

48. There are large, unexplained differences among these results.<sup>16</sup> I do not see how Plaintiff Donna Curling can have reasonable confidence that her vote was counted at all, much less counted as cast.

<sup>16</sup> There appears to be some cancellation of error, but I understand that the hand count kept ballots cast in different ways (advance in-person, absentee by mail, and election day) separate. It

49. The Secretary of State attributed all differences between the audit and the original count to human counting error, citing a 2012 study that found hand-count error rates as high as 2 percent.<sup>17</sup> This is simplistic, unfounded, and disingenuous.
50. While human error almost certainly accounts for *some* of the difference, there is no evidence that it accounts for most of the difference, much less the entire difference, as Secretary of State Raffensperger claimed.
51. The original count and audit agree with each other (but not with the recount) regarding the number of election-day votes for Biden and Jorgensen. The audit found 50 more election-day votes for Trump than the original tally, and 81 more than the machine recount found: a difference of almost 50 percent. These differences have not been investigated and are unexplained. A hypothesized error rate of 2 percent in hand counts does not suffice.
52. A fact central to this case is that the differences might result from discrepancies between the QR-encoded votes and the human-readable votes on BMD printout and/or from misconfiguration, bugs, or malware on the scanners or tabulators. As discussed above, the audit checked none of these things. There is no basis whatsoever to conclude that the differences result entirely from human error without investigating the other possibilities.

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is not clear how misclassification of the mode of voting would affect one candidate's totals much more than the other candidates. Regardless, these discrepancies are large and should be investigated, including inspecting the physical ballots.

<sup>17</sup>

[https://sos.ga.gov/index.php/elections/historic\\_first\\_statewide\\_audit\\_of\\_paper\\_ballots\\_upholds\\_result\\_of\\_presidential\\_race](https://sos.ga.gov/index.php/elections/historic_first_statewide_audit_of_paper_ballots_upholds_result_of_presidential_race), last accessed 10 January 2022.

53. The hand count could easily be more accurate than the machine count. Indeed, it is well known that hand counts of hand-marked paper ballots are often more accurate than machine counts, in part because human readers can interpret light, improper, and ambiguous marks better than machines can, even when the machines are working properly. Similarly, experience in Georgia in 2020 shows that Dominion’s scanner settings (low resolution, black-and-white) can cause voters’ selections not to appear at all in images of ballots, selections that human readers looking at the actual ballots can easily discern.<sup>18</sup>
54. Evidence that hand counts are more accurate than machine counts comes from recounts and studies of the “residual vote,”<sup>19</sup> the number of undervotes and overvotes. Hand counts generally find more valid votes than machine counts.<sup>20</sup>
55. Hand-count error rates are known to depend on many factors, including ballot design, the method for hand counting (“sort-and-stack” versus “read-and-mark”), and the size of each counting team. They presumably also depend on whether there are additional

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<sup>18</sup> See, e.g., Judge Amy Totenberg’s Opinion and Order of 11 October 2020 in the present matter, at 4, 30, 95, 101, 103, 114–135.

<sup>19</sup> Ansolabehere, S., and Reeves, A., 2004. Using Recounts to Measure the Accuracy of Vote Tabulations: Evidence from New Hampshire Elections 1946–2002, in *Confirming Elections: Creating Confidence and Integrity Through Election Auditing*, Alvarez, R.M., L.R. Atkeson, and T.E. Hall, eds., Palgrave MacMillan, NY. Alvarez, R.M., D. Beckett, D., and C. Stewart, 2013. Voting Technology, Vote-by-Mail, and Residual Votes in California, 1990–2010. *Political Research Quarterly*, 66(3), 658–670. <https://doi.org/10.1177/1065912912467085>. Alvarez, R.M., L.R. Atkeson, and T.E. Hall, 2013. *Evaluating Elections: A Handbook of Methods and Standards*, Cambridge University Press, NY.

<sup>20</sup> See, e.g., Ansolabehere, S., and C. Stewart, 2005. Residual Votes Attributable to Technology. *The Journal of Politics*, 67(2), 365–389. <https://doi.org/10.1111/j.1468-2508.2005.00321.x>; Carrier, M.A., 2005. Vote Counting, Technology, and Unintended Consequences, *St. John’s Law Review*, 79(3), 645–687; Ansolabehere, S., B.C. Burden, K.R. Mayer, and C. Stewart III, 2018. Learning from Recounts, *Election Law Journal*, 17(2), 100–116, DOI: 10.1089/elj.2017.0440



quality control measures in place, such as checking sorted piles of ballots to ensure that each pile really has votes for just one candidate.

56. The study<sup>21</sup> cited by the Georgia Secretary of State is a laboratory study with 108 subjects and 120 ballots, each containing 27 contests with two candidates. It used three kinds of “ballots”: printout from two kinds of DRE (direct-recording electronic) voting system and an optical scan ballot. The highest error rates were for thermal printout from DREs, which does not resemble Georgia’s BMD printout nor Georgia’s hand-marked paper ballots. The method with the highest error was the “sort-and-stack” tally method that Georgia chose to use in its audit. This study did not observe hand vote tabulation in a real election, nor did it involve BMD summary printout. To my knowledge, there is no study of the accuracy of counting votes from BMD summary printout.

57. Differences between the original count and the machine recount are also large and unexplained. The difference between the two machine counts of Biden’s Absentee votes is almost 3 percent. Absent access to the physical ballots, software, and equipment, it is impossible to know what went wrong, nor whether the differences are primarily attributable to malware, bugs, misconfiguration, or human error.

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**Pursuant to the Court’s Order (Order Doc. 1322) permitting the supplementation of this report in the context of my engagement concerning the processes, adequacy, and quality of**

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<sup>21</sup> Goggin, S.N., M.D. Byrne, and J.E. Gilbert, 2012. Post-Election Auditing: Effects of Procedure and Ballot Type on Manual Counting Accuracy, Efficiency, and Auditor Satisfaction and Confidence, *Election Law Journal: Rules, Politics, and Policy*, 36–51, DOI: 10.1089/elj.2010.0098

**Georgia's audit procedures, Paragraphs 58–84, *infra*, were added in the 9 March 2022 version.**

**The two machine counts in Fulton County**

58. I examined the internal consistency of the two machine counts (the original machine count and the machine recount) in Fulton County. I relied on election data provided in electronic form by Coalition Plaintiffs. I understand those data to be the election management system data for Fulton County for the two machine counts. A declaration from Marilyn Marks attesting to the provenance of the data is attached hereto as Appendix 5. The data include cast vote records, scanned images of ballots and BMD printout, and other files.
59. I analyzed the Fulton County election data using software I wrote, attached hereto as Appendix 6. I also relied on two spreadsheets provided by the Coalition Plaintiffs. Those spreadsheets purport to identify groups of images (among the Fulton County election materials) that appear to be repeated images of the same pieces of paper. I do not know in detail how those spreadsheets came to exist—but as described below, I checked the accuracy of those spreadsheets as part of this report.
60. To confirm that I had received the correct Fulton County election data from Coalition Plaintiffs and that I was reading it correctly, I counted the votes for Donald J. Trump,

Joseph R. Biden, and Jo Jorgensen. For both machine counts, I found the same totals officially reported for Fulton County:<sup>22</sup>

Candidate	First machine count	Second machine count
Donald J. Trump	137,240	137,247
Joseph R. Biden	381,144	380,212
Jo Jorgensen	6,275	6,320

61. The number of cast vote records (the voting system's record of the votes on each ballot or BMD printout card, from which the system tabulates results) in the two machine counts in Fulton County were rather different: 528,776 in the first count and 527,925 in the second count, a difference of 851. To my knowledge, Fulton County has not explained this discrepancy.

62. The number of cast vote records in the two machine counts should be equal.

Differences might occur if (i) some ballots or BMD printout cards were misplaced or found between the two machine counts, so a different number pieces of paper was scanned in the two machine counts; (ii) malware, bugs, misconfiguration, or a bad actor added, deleted, or altered records in the election management system in one or both machine counts; (iii) Fulton County did not scan every validly cast ballot or BMD printout card exactly once in each machine count. Below, I present compelling evidence that (ii) or (iii) is true, but all three possibilities could be true simultaneously. In particular, without further discovery, it is impossible to rule out any of the possibilities.

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<sup>22</sup> First machine count results:

<https://results.enr.clarityelections.com/GA/Fulton/105430/web.264614/#/summary> (last visited 8 March 2022) Second machine count results:

<https://results.enr.clarityelections.com/GA/107231/web.264614/#/detail/5000?county=Fulton> (last visited 8 March 2022)

63. Fulton County did not produce the image file corresponding to every cast vote record. For the first machine count, production included images of ballots or BMD printout cards for only 168,726 of the 528,776 cast vote records: 376,863 image files are missing. For the second machine count, Fulton County's production included images of ballots or BMD printout cards for 510,073 of the 527,925 cast vote records: 17,852 image files are missing.
64. Entire batches of images are missing from Fulton County's production, for example, images from Scanner 801 batch 117 and Scanner 801 batch 118 are referred to in the cast vote records for the second machine count but the images were not among the electronic records. Without additional discovery it is impossible to determine whether the missing images are missing because of human error, programming errors (bugs), or malware in Fulton County's election management system (EMS). Of course, those possibilities are not mutually exclusive.
65. It is nonetheless possible to use the produced images to show that Fulton County's election results included many votes more than once in the reported tabulations. The full extent of this multiple-counting problem cannot be determined without additional discovery, but there is ample evidence that it added thousands of bogus votes to the reported machine-count results. That is, thousands of Fulton County voters' votes were included in the reported totals more than once. From the production so far, it is not possible to determine conclusively whether any voter's votes were omitted from the reported totals.
66. I now describe how I established that some votes were included in the reported totals more than once.

67. Repeatedly scanning the same piece of paper generally does not produce images that are bitwise identical, because of variations in the alignment of the paper, illumination within the scanner, dirt on scanner lenses, etc. Similarly, a single scan can be altered digitally to produce multiple images that look similar but are not bitwise identical.
68. Small variations in voters' marks (e.g., not filling an oval completely or straying outside the oval) on hand-marked paper ballots generally make it possible to tell whether two separate scans of hand-marked paper ballots that contain the same votes are scans of the same physical ballot.
69. It is not generally possible to tell whether two 200dpi black-and-white scans of BMD printout cards are scans of the same piece of paper simply by looking at those two scans, because BMD printout cards containing the same votes look the same at low resolution in black-and-white.<sup>23</sup> However, if both scans contain a rare write-in name or rare combination of write-in names, that is evidence of a duplicate. Similarly, if a series of votes is repeated in in the same order (or reverse order) in different scan batches of BMD printout, that is also evidence that they are repeated images of the same collection of paper. If the duplicated (or reversed) vote sequences are long and include rare write-in names, the evidence that they are scans of the same physical pieces of paper is particularly compelling.
70. As mentioned in paragraph 46, *supra*, I understand that plaintiff Donna Curling votes in Fulton County precinct RW01. In one of the spreadsheets mentioned in paragraph

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<sup>23</sup> A sufficiently high-resolution scan might make it possible to identify differences in the arrangement of the paper fibers. See W. Clarkson, T. Weyrich, A. Finkelstein, N. Heninger, J. A. Halderman and E. W. Felten, 2009. Fingerprinting Blank Paper Using Commodity Scanners, *2009 30th IEEE Symposium on Security and Privacy*, 301–314, doi: 10.1109/SP.2009.7

58, *supra*, Coalition Plaintiffs identified 12 hand-marked ballots from Fulton County precinct RW01 that were scanned twice in the first machine count (the original election). The pairs of images are listed in the table below. The format of the numbers is

[scanner number]\_[batch number]\_[image number].

pair	Image A	Image B
1	05162_00234_000096	05162_00235_000057
2	05162_00234_000093	05162_00235_000054
3	05162_00234_000074	05162_00235_000036
4	05162_00234_000072	05162_00235_000034
5	05162_00234_000068	05162_00235_000030
6	05162_00234_000069	05162_00235_000031
7	05162_00234_000054	05162_00235_000014
8	05162_00234_000031	05162_00235_000090
9	05162_00234_000026	05162_00235_000085
10	05162_00234_000017	05162_00235_000076
11	05162_00234_000013	05162_00235_000072
12	05162_00234_000014	05162_00235_000073
13	05162_00234_000003	05162_00235_000062
14	05162_00234_000001	05162_00235_000060

71. I wrote a program to display ballot images of ballots side by side to check whether they look the same. The software is in Appendix 6. Appendix 7 shows these 14 pairs of repeated images. I confirmed that they are indeed duplicated scans by visually matching slight irregularities in the voters' marks in each pair.
72. Coalition Plaintiffs identified at least three BMD cards from precinct RW01 that each appear to have been scanned twice in the machine recount in RW01, based on the votes and the order in which they were scanned in two batches. In particular, Scanner 801, batches 43 and 44—both comprising scans of advance in-person BMD printout cards—start with images of 214 BMD cards that appear to be the same in both batches: the same sets of votes in the same order. The two batches were scanned within about five minutes of each other, according to the timestamps in the images.

Many of the images show write-in votes<sup>24</sup> or votes for third-party candidates, further evidence that the similarity was no coincidence. I visually inspected<sup>25</sup> all 214 pairs and confirmed that they match: compelling evidence that those BMD cards were scanned twice in the machine recount. The other 211 (214–3=211) duplicated scans are of BMD cards from other precincts in Fulton County.

73. Coalition Plaintiffs also identified one hand-marked paper ballot that was scanned twice in RW01 in the machine recount, and at least seven hand-marked paper ballots that were scanned thrice in RW01 in the machine recount. I used the software in Appendix 6 to check their work: the twenty-nine images indeed seem to represent only eleven distinct pieces of paper, even though they contributed twenty-nine votes to some contests, including the presidential contest. Appendix 8 shows the sets of images. The table below lists the pairs and triples.

Multiple	Image A	Image B	Image C
1	00801_00044_000168	00801_00043_000168	
2	00801_00044_000083	00801_00043_000083	
3	00801_00044_000042	00801_00043_000042	
4	05160_00074_000023	05160_00067_000008	
5	00794_00017_000024	00791_00026_000091	00791_00019_000010
6	00794_00017_000029	00791_00026_000086	00791_00019_000015
7	00794_00018_000001	00791_00026_000009	00791_00019_000092
8	00794_00018_000011	00791_00026_000019	00791_00019_000082
9	00794_00019_000002	00791_00026_000079	00791_00019_000022
10	00794_00019_000005	00791_00026_000076	00791_00019_000025
11	00794_00019_000006	00791_00026_000075	00791_00019_000026

<sup>24</sup> Write-ins included votes for “Anyone,” “XXX,” “Willie Nelson,” and “Alexander Hamilton,” as well as write-in votes for “Donald Trump” for District Attorney, Clerk of the Superior Court, Tax Commissioner, Sheriff, Solicitor General, and Surveyor.

<sup>25</sup> I used the software in Appendix 6 to facilitate the process.

74. To confirm that the duplicate and triplicate images were included in the reported vote tabulation, I searched the cast-vote records (CVRs) produced by Fulton County for each image identifier among the duplicates and triplicates of images of RW01 ballots and BMD printout cards. All twenty-four from the original count and all twenty-nine from the machine recount were among the CVRs. I conclude that the duplicate and triplicate votes were included in the reported machine tabulations, since the vote totals derived from the CVRs agree with the reported vote totals, as mentioned in paragraph 60, *supra*.
75. For Fulton County as a whole, Coalition plaintiffs gave me a list that identified images of 2,871 ballots and BMD printout cards that they believe were counted two or three times in the second machine count. Some were identified by visual inspection of the images; others were inferred to be duplicates because a sequence of cast vote records was identical (or reversed) for long portions of two scan batches. As mentioned in paragraph 72, *supra*, I confirmed that 214 of the purported duplicate scans of BMD cards were indeed duplicates. I understand that this list of 2,871 are a sample from a larger list of images of ballots and BMD printout cards that Coalition Plaintiffs assert were included in the tabulation twice or more. I confirmed that all 6,118 images in question were referenced in cast vote records in the second machine count, so all presumably contributed to the tabulation.
76. Nine hundred sixteen (916) of the 2,871 sets of images were identified as images of hand-marked paper ballots. I drew a random sample of 100 of those 916 using software in Appendix 6. I set the seed for the pseudo-random number generator using



ten rolls of ten-sided dice. Appendix 9 is an image of the dice with the digits they showed, in order: 8, 6, 2, 8, 9, 2, 2, 1, 8, 4.

77. Of the 100 sets of images in the sample, 46 contained triplicate images.

78. I examined the sets of images visually, aided by software in Appendix 6. I agreed with the Coalition Plaintiffs' determination for 98 of the 100 sets. I disagreed with the determination for one of the sets, and I was unable to verify one set. To be conservative, I treat this as 98 agreements in 100 checks. The resulting 95 percent lower confidence bound for the number of hand-marked paper ballots represented by two or more scans is 891 ballots. That is, there is 95 percent statistical confidence that at least 891 of the 918 claimed multiples are genuine multiples.

79. I did not have time to examine more purported replicate images of BMD printout beyond the 214 mentioned in paragraph 72, but I might examine more before trial.

80. Based on the observations in paragraphs 58 through 78, *supra*, it seems that Fulton County did not keep track of which ballots and BMD cards had been scanned and which had not, in both the original count and in the machine recount. Alternatively or additionally, the electronic records were altered accidentally or intentionally. The electronic records of the election are not intact. This is a surprising lack of tracking and protecting election materials: the most basic election safeguard is to check whether the number of voters who participated is equal to the number of ballots and BMD printout cards that were cast and to the number that were tabulated. Moreover, I would expect all electronic election materials to be backed up onsite and offsite, at least for the federally mandated retention period of twenty-two months, so the loss of

hundreds of thousands of image files from the first machine count and of nearly 18,000 images from the second machine count is hard to fathom.

81. Fulton County would have noticed these errors had they simply kept track of ballots and BMD printout cards and checked the total number against the number reported in the electronic tabulation. It seems that Fulton County does not know how many ballots and BMD printout cards were cast in the election, how many voters cast votes, or how many pieces of paper were scanned—nor how those numbers compare to each other. Absent basic ballot accounting, pollbook reconciliation, and counting of electronic records, it is unsurprising that the two machine tallies differ so much (see the table below paragraph 47, *supra*). The U.S. Election Assistance Commission has published best practices for chain of custody.<sup>26</sup>
82. Fulton County’s chaotic, unaccountable curation and processing of cast ballots, cast BMD printout, and electronic records make a true risk-limiting audit impossible. It is unreasonable for voters to trust that their votes were counted at all, much less counted correctly. Voters have good reason to believe that some votes counted more than others: some votes were included twice or thrice in the totals. There is no way to know how many votes were omitted from the tabulation, absent access to the physical ballots and BMD printout and evidence that the chain of custody is intact. From the records produced so far, it is impossible to determine whether malware, bugs, misconfiguration, or malfeasance disenfranchised voters or altered the election results.

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<sup>26</sup> [https://www.eac.gov/sites/default/files/bestpractices/Chain\\_of\\_Custody\\_Best\\_Practices.pdf](https://www.eac.gov/sites/default/files/bestpractices/Chain_of_Custody_Best_Practices.pdf) (last visited 9 March 2022)

83. Based on my review of the Fulton County post-election audit, it is clear that the audit planning, process, and controls did not detect the double and triple counting documented above. Even if Fulton County did not rely on ballot-marking devices for virtually all in-person voters, the lack of basic accounting controls makes it impossible to determine who really won an election contest, even by hand counting the votes: the record of the vote could easily be incomplete or adulterated. This remains true even if BMDs could be relied upon to print voters' selections accurately.

84. I have no reason to believe that problems of the kinds described above are limited to Fulton County, but because of time constraints, I have not yet investigated other counties. I might examine data from other Georgia counties before trial, including comparing the tabulations based on images and cast-vote records to the ABBSs, other RLA workpapers, and reported results.

**The paragraphs below were in the version of this report submitted 11 January 2022, but they have been renumbered.**

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## **Summary**

85. A rigorous audit can provide confidence that a well-run election found the true winner(s). But it cannot compensate for using untrustworthy technology to record votes or for a poorly run election; in such circumstances, it distracts attention from the real problems rather than improving election integrity and justifying confidence in electoral outcomes. Absent a trustworthy record of the votes, no procedure can provide affirmative evidence that the reported winner(s) really won. Georgia lacks such a

record, for many reasons, including the heavy reliance on BMDs and the lack of physical accounting of ballots, memory cards, and other election materials; lack of pollbook and voter participation reconciliation; etc.

86. By claiming to perform risk-limiting audits when its paper trail is not trustworthy, the State of Georgia is in effect adding stories to a building that needs its foundation replaced. First things first.
87. To provide reasonable assurance that every voter's selections are counted and counted accurately requires systematic improvements to how Georgia conducts elections:
  - a) For every voter to be assured the right to cast an accountable vote, every voter should have the opportunity to mark a ballot by hand, whether voting in person in advance, in person on election day, or absentee by mail.
  - b) The use of ballot-marking devices should be reduced to a minimum, for reasons I have explained in previous declarations. In particular:
    - i. BMDs do not necessarily print voters' selections accurately. They can be hacked or misconfigured, as explained in Prof. J. Alex Halderman's testimony.
    - ii. A growing body of empirical work shows that few voters check the BMD printout, and those who do rarely catch errors.
    - iii. There is no way for a voter to prove to an election official or anyone else that a BMD malfunctioned. Hence, there is no way to "close the loop" to ensure that malfunctioning devices are removed from service, even if some voters notice BMDs misbehaving. And even if a device is caught misbehaving, there is no way to reconstruct the correct election outcome.

- iv. There is no way to test BMDs adequately prior to, during, or after an election to establish whether they altered votes, even if they altered enough votes to change electoral outcomes.<sup>27</sup>
- c) Georgia must implement better procedures and checks on chain of custody of election materials, especially voted ballots. Currently, Georgia is not in a position to determine whether every validly cast ballot was included in the reported results, nor whether there was electronic or physical “ballot-box stuffing” or votes were altered.<sup>28</sup> Georgia needs better protocols for using and checking physical security seals on ballots and voting equipment—and demonstrating that it has followed those protocols. It needs to perform routine scrutiny of custody logs and surveillance video, and to institute other related security measures.
- d) Internal consistency checks and physical inventories must be performed as part of Georgia’s canvass, including, among other things:
- i. Verifying that the number of ballots sent to each polling location (and blank paper stock for ballot-marking devices and ballot-on-demand printers) equals the number returned voted, spoiled, or unvoted. This must

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<sup>27</sup> See note 8, *supra*.

<sup>28</sup> This is evidenced by the fact that the 2020 audit found thousands of untabulated ballots. See note 14, *supra*. Per the Secretary of State’s office, “[t]he audit process also led to counties catching making mistakes they made in their original count by not uploading all memory cards.” [https://sos.ga.gov/index.php/elections/historic\\_first\\_statewide\\_audit\\_of\\_paper\\_ballots\\_upholds\\_result\\_of\\_presidential\\_race](https://sos.ga.gov/index.php/elections/historic_first_statewide_audit_of_paper_ballots_upholds_result_of_presidential_race), last accessed 9 January 2022. Because of Georgia’s inadequate physical accounting for voting materials, there is no way to know how many more votes validly cast in that election have not been included in any of the reported results. Moreover, the lax recordkeeping evidently resulted in scanning the same batches of ballots more than once. Similarly, some ABBSs were presumably entered more than once, and as shown above, some were not entered at all.

- be a physical check based on manual inventories, not on reports from the voting system.
- ii. Checking pollbooks and other voter participation records against the number of voted ballots received, including checking whether the appropriate number of ballots of each “style” were received.
  - iii. Checking whether the number of electronic vote records (“scans” and cast-vote records) agrees with the physical inventory of ballots of each style.
- e) Georgia should conduct routine “compliance” audits, a necessary precursor to conducting risk-limiting audits. For a list of what compliance audits should include, see, for example, Appel, A., and P.B. Stark, 2020. Evidence-Based Elections: Create a Meaningful Paper Trail, Then Audit, *Georgetown Law Technology Review*, 4, 523–541.
- f) Georgia should conduct routine, genuine,<sup>29</sup> risk-limiting audits of *every* contested race in every election. The audits must have the ability to correct the reported outcome if the outcome is wrong, before the outcome is certified. I understand that under current Georgia law, audits take place only every other year, for only one contest, and cannot change electoral outcome or trigger a recount—even if the audit finds that the outcome is wrong. No matter how rigorous an audit is, an audit of one or more contests provides no evidence that the outcome of any unaudited contest is correct. Errors and malware may affect some contests but not others.

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<sup>29</sup> The pilots of RLA procedures in Georgia were not genuine RLAs, nor was the “full hand-count audit.”

g) A genuine RLA requires far more than Georgia has yet attempted. First and foremost, it requires a trustworthy record of voter intent. Georgia's records are untrustworthy for a range of reasons, starting with the fact that all in-person voters are expected or required to use ballot-marking devices (BMDs). As discussed at length in previous declarations and in testimony by Prof. Andrew Appel and Prof. J. Alex Halderman, BMD printout is not a trustworthy record of the vote. There are also issues with Georgia's verification of voter eligibility and voter participation. But even if every voter used a hand-marked paper ballot and there were no issues with voter eligibility, Georgia simply does not keep track of their election materials well enough. As discussed in my previous declarations, the foundation for a risk-limiting audit is a *ballot manifest*, a physical inventory of the paper ballots describing in detail how they are stored. This must be derived without reliance on the voting system; otherwise, the audit is trusting the voting system to check itself. For example, if there are ballots that were never scanned or scans that were never uploaded (as discovered during the 2020 "audit"), they will be missing from a manifest derived from voting system reports. The ballot manifest must be based on physical inventories of the ballots, keeping track of where the ballots are and how they are organized. Absent that, it is impossible to account for votes reliably, and impossible to limit the risk that an incorrect electoral outcome will be certified: applying risk-limiting audit procedures to an untrustworthy collection of ballots is "security theater."

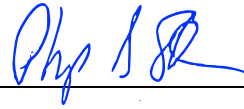
88. There are additional checks that could be performed to determine the root cause of the discrepancies among the first machine tabulation, hand count, and machine recount. Those checks require access to the physical ballots (for instance, to determine whether

every scan batch from the tabulators reflects a distinct collection of actual physical ballots) and access to the tabulators, software, and servers (by other experts in this matter).

89. I would like to supplement my report once the Plaintiffs have had the opportunity to review materials that Defendants have not yet produced or provided access to, including ballots, and to review Plaintiffs' experts' reports once they have inspected the hardware and software used in the November 2020 election.

I declare under penalty of perjury, in accordance with 28 U.S.C. § 1746, that the foregoing is true and correct.

Executed on this date, ~~11 January 2020~~ 9 March 2022,



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Philip B. Stark



# **APPENDIX 1**

# Curriculum Vitae

## Philip Bradford Stark

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*P.B. Stark: CV*

*March 9, 2022*

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## **Biographical Information**

**Born:** 7 October 1960, Houston, Texas.

**Citizenship:** U.S.A.

## **Interests**

**Theory:** Inference, inverse problems, multiplicity, nonparametrics, optimization, restricted parameters, sampling

**Applications:** Astrophysics, cosmology, ecology, elections, geophysics, health, legislation, litigation, marketing, physics, public policy, risk assessment and control, uncertainty quantification

## **Appointments**

**7/2019–6/2021** Regional Associate Dean (interim), College of Chemistry and Division of Mathematical and Physical Sciences (ChAMPS), University of California, Berkeley

**10/2015–6/2021** Associate Dean, Division of Mathematical and Physical Sciences, University of California, Berkeley

**6/2016–8/2016** Visiting Professor of Theoretical Computer Science, IT University of Copenhagen

**7/2012–6/2015** Chair, Department of Statistics, and Director, Statistical Computing Facility, University of California, Berkeley

**7/2011–6/2012** Vice Chair, Department of Statistics, University of California, Berkeley

**7/2011–8/2011** Acting Chair, Department of Statistics, University of California, Berkeley

**7/2008–present** Faculty, Designated Emphasis in Computational and Data Science and Engineering, University of California, Berkeley

*P.B. Stark: CV*

*March 9, 2022*

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**7/1998–present** Professor, Department of Statistics, University of California, Berkeley

**7/2001–6/2003** Faculty Assistant in Educational Technology (to Vice Provost for Undergraduate Education), University of California, Berkeley

**6/1996** Visiting Associate Professor, School of Mathematical Sciences, Tel Aviv University, Tel Aviv, Israel

**7/1994–6/1998** Associate Professor, Department of Statistics, University of California, Berkeley

**7/1988–6/1994** Assistant Professor, Department of Statistics, University of California, Berkeley

**7/1987–6/1990** National Science Foundation Postdoctoral Fellow in Mathematical Sciences

**1/1987–6/1987** Postgraduate Research, Department of Statistics, University of California, Berkeley

**8/1986–12/1986** Postgraduate Research, Institute for Geophysics and Planetary Physics, UC San Diego

## **Awards and Fellowships**

Velux/Villum Foundation Visiting Professor Programme (2015–2016)

Leamer-Rosenthal Prize for Transparency in Social Science (2015)

Chancellor's Award for Public Service, Research in the Public Interest, University of California, Berkeley (2011)

John Gideon Award for Election Integrity, Election Verification Network (2011)

Mellon Library/Faculty Fellow for Undergraduate Research (2006–2007)

*P.B. Stark: CV*

*March 9, 2022*

3

Presidential Chair Fellow, University of California, Berkeley (2003–2004)

Fellow, American Statistical Association (selected 2014)

Fellow, Institute of Physics (elected 1999)

Miller Research Professor, Miller Institute for Basic Research in Science (1999)

Dobson Fellow, University of California at Berkeley (1998, 1999)

Presidential Young Investigator (1989–1995)

National Science Foundation Postdoctoral Fellowship in Mathematical Sciences (1987–1989)

University Fellowship, University of Texas at Austin (1982–1983)

## **Professional Societies**

American Statistical Association: Fellow and Accredited Professional Statistician

Association of Foragers

Bernoulli Society for Mathematical Statistics and Probability

Institute of Mathematical Statistics

Institute of Physics: Fellow and Chartered Physicist

International Statistical Institute

Royal Astronomical Society: Fellow

## **Education**

A.B. 1980, Princeton University, Princeton, New Jersey

Ph.D. 1986, University of California, San Diego, La Jolla, California

P.B. Stark: CV

March 9, 2022

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## Mentors

Robert L. Parker, Institute for Geophysics and Planetary Physics, Scripps Institution of Oceanography, University of California, San Diego (PhD dissertation advisor)

George E. Backus, Institute for Geophysics and Planetary Physics, Scripps Institution of Oceanography, University of California, San Diego (postdoctoral advisor)

David L. Donoho, Department of Statistics, Stanford University (post-doctoral advisor)

## Publications

### Refereed Publications

1. Stark, P.B. and C. Frohlich, 1985. The depths of the deepest deep Earthquakes, *Journal of Geophysical Research*, *90*, 1859–1869.
2. Stark, P.B., R.L. Parker, G. Masters, and J.A. Orcutt, 1986. Strict bounds on seismic velocity in the spherical Earth, *Journal of Geophysical Research*, *91*, 13,892–13,902.
3. Stark, P.B., 1986. *Travel-Time Inversion: Regularization and Inference*, Ph.D. Thesis, Scripps Institution of Oceanography, University of California, San Diego, 106pp.
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284. Copyright, Academic Freedom, and Moral Hazard, Publish or Perish Reframed: Navigating the New Landscape of Scholarly Publishing, UC Berkeley Library, Berkeley, CA, 31 January 2020. <https://www.stat.berkeley.edu/~stark/Seminars/reproUCBLib20.slides.pdf>
283. Risk-Limiting Audits, MAA Invited Paper Session on “Can Mathematics Help Us Trust Our Elections Again?,” Joint Mathematics Meetings, Denver, CO, 15–18 January 2020. <https://www.stat.berkeley.edu/~stark/Seminars/auditMAA20.slides.pdf>
282. Election Hacking and Security, Kensington Public Library, Kensington, CA, 13 January 2020. <https://www.stat.berkeley.edu/~stark/Seminars/auditKensing20.slides.pdf>
281. Eat your Weedies: How Wild and Feral Foods can be a Delicious & Nutritious Addition to your Diet, *Seabourn Ovation*, 25 November 2019. <https://www.stat.berkeley.edu/~stark/Seminars/forageSeabourn19.slides.pdf> (with D. Miller)

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280. The Shape of Truth: Perspectives from Science and the Humanities, panelist (with John Campbell, Randy Schekman, Namwali Serpell), Flatiron Institute, New York, NY, 5 November 2019.
279. Practical Countermeasures for Election Hacking, Influencers *Mirror*, San Francisco, CA, 18 October 2019. <https://www.stat.berkeley.edu/~stark/Seminars/auditInfluencers19.html>
278. Seismic Salad: Fresh Food after The Big One, Berkeley Emergency Prep Fair, Berkeley, CA, 12 October 2019.
277. RLAs and my Beefs with BMDs, The Coming 2020 Election Crisis: In Paper We Trust—3rd National Election Integrity Conference, Berkeley, CA, 5–6 October 2019. <https://www.stat.berkeley.edu/~stark/Seminars/auditVRTF19.slides.pdf>. Video: <https://youtu.be/3kICZB1pq0A>
276. Trustworthy Elections: Evidence and Dispute Resolution, Voting Village, Def Con, Las Vegas, NV, 8–11 August 2019. <https://www.stat.berkeley.edu/~stark/Seminars/auditDefcon19.slides.pdf>
275. *P*-values are really quite nifty, Invited panel: “The *P*-Value Controversy: Where Do We Go from Here?,” 2019 Joint Statistical Meetings, Denver, Colorado, 29 July 2019. <https://www.stat.berkeley.edu/~stark/Seminars/jsm-p-values-19.slides.pdf>
274. Growing Food on a Changing Planet: Roles for Biomimicry San Francisco Design Week, San Francisco, CA, 27 June 2019. <https://www.stat.berkeley.edu/~stark/Seminars/forageTeaLeaves19.slides.pdf>
273. Evidence-Based Elections and Risk-Limiting Audits, University of Melbourne, Melbourne, Australia, 17 April 2019. <https://www.stat.berkeley.edu/~stark/Seminars/auditUMelb19.htm>
272. Student Evaluations of Teaching Do Not Measure Teaching Effectiveness. What Do They Measure? School of Computing and Information Systems, University of Melbourne, Melbourne, Australia, 16 April 2019. <https://www.stat.berkeley.edu/~stark/Seminars/setUMelb19.htm>

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271. Wild/Feral Food Identification Walk, Society for Conservation Biology, Berkeley Chapter, University of California, Berkeley, 13 March 2019.
270. Preproducibility: What may we, with advantage, omit?, Aquaculture 2019 Workshop on Zebrafish Husbandry, Keynote lecture, New Orleans, LA, 7–11 March 2019, <https://www.stat.berkeley.edu/~stark/Seminars/reproZebra19.pdf>
269. Protecting the Front Line: County Election Security in the 21st Century, Panel on election and voting technology, Google, Mountain View, CA, 6 March 2019.
268. Predictive Policing and the ETAS Model, National Association of Criminal Defense Lawyers, San Francisco, CA, 11 February 2019. <https://www.stat.berkeley.edu/~stark/Seminars/nacd19.pdf>
267. Student Evaluations, Quantifauxcation, and Gender Bias, Information Theory Forum, Stanford University, Stanford, CA, 8 February 2019. <https://www.stat.berkeley.edu/~stark/Seminars/setStanford19.htm>, Video: [https://youtu.be/xo\\_ECVymy7Y](https://youtu.be/xo_ECVymy7Y)
266. TweetChat on Risk-Limiting Audits, MIT Election Data and Science Lab, 7 February 2019.
265. Student Evaluations, Quantifauxcation, and Gender Bias, The Science of Teaching: Evidence-Based Approaches in Biology Education Division of Biological Sciences Seminar Program, University of California, San Diego, San Diego, CA, 4 February 2019. <https://www.stat.berkeley.edu/~stark/Seminars/setUCSD19.htm>
264. Risk-Limiting Audits, Making Every Vote Count: A Practical Guide to Risk-Limiting Audits, Washington, DC, 31 January 2019. <https://www.stat.berkeley.edu/~stark/Seminars/auditDC19.pdf> Video: [https://youtu.be/gMbz0\\_dizoA](https://youtu.be/gMbz0_dizoA)
263. Classical Statistics in Modern Elections, Conference in Honor of Prof. Yoav Benjamini's 70th Birthday, Jerusalem, Israel, 17–20 December 2018. <https://www.stat.berkeley.edu/~stark/Seminars/auditBenja18.htm>

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262. Simulating a Ballot-Polling Risk-Limiting Audit with Cards and Dice, Multidisciplinary Conference on Election Auditing, MIT, Cambridge, MA, 7–8 December 2018. <https://www.stat.berkeley.edu/~stark/Seminars/ballotPollingSimulation.pdf>
261. Risk-Limiting Audits and Evidence-Based Elections, Multidisciplinary Conference on Election Auditing, MIT, Cambridge, MA, 7–8 December 2018. <https://www.stat.berkeley.edu/~stark/Seminars/auditMIT18.htm>
260. The Shape of Truth: Perspectives from Science and the Humanities, panelist (with Randy Schekman and John Campbell), Los Angeles, CA, 28 November 2018.
259. How to Tell if an Election Has Been Hacked, Nerd Nite, Oakland, CA, 26 November 2018. <https://www.stat.berkeley.edu/~stark/Seminars/auditNerdNite18.htm>
258. Student Evaluations of Teaching: Managing Bias and Increasing Utility, Center for Education Innovation and Learning in the Sciences, University of California, Los Angeles, Los Angeles, CA, 2 November 2018. <https://www.stat.berkeley.edu/~stark/Seminars/setUCLA18.htm>
257. Student evaluations of teaching do not measure teaching effectiveness. What do they measure?, Stanford-Berkeley Joint Colloquium, Department of Statistics, Stanford University, Stanford, CA, 30 October 2018. <https://www.stat.berkeley.edu/~stark/Seminars/setStanford18.htm>
256. Will my vote count? Political Science 191, University of California, Berkeley, 23 October 2018.
255. Availability, Safety, Palatability, and Nutrient Density of Wild and Feral Foods in Urban Ecosystems, ESPM 117, University of California, Berkeley, 16 October 2018. <https://www.stat.berkeley.edu/~stark/Seminars/forageESPM18.pdf>
254. Preproducibility, STEM Carib Conference, University College of the Cayman Islands, Grand Cayman Island, 9–12 October

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2018 <https://www.stat.berkeley.edu/~stark/Seminars/preproducibilityUCCI18.htm>

253. Measuring Gender Bias in Student Evaluations of Teaching, STEM Carib Conference, University College of the Cayman Islands, Grand Cayman Island, 9–12 October 2018 <https://www.stat.berkeley.edu/~stark/Seminars/setUCCI18.htm>
252. PSHA is naked—and it doesn't work, Workshop: Which Way SPRA?, 14th Conference on Probabilistic Safety Assessment and Management, UCLA, Los Angeles, CA, 16 September 2018. <https://www.stat.berkeley.edu/~stark/Seminars/psha-ucla-18.slides.html>
251. Resilient Greens: Nutrition, Toxicology, & Availability of Edible Weeds in the East Bay, with D. Miller, T. Carlson, and K.R. de Vasquez, Global Climate Summit, University of California, Davis, 10 September 2018.
250. Statistical Modeling, Machine Learning, and Inference, Machine Learning for Science Workshop, Lawrence Berkeley National Laboratory, Berkeley, CA, 4–6 September 2018. <https://www.stat.berkeley.edu/~stark/Seminars/lbl-ml18.slides.html>
249. Securing our Elections, Town Hall Meeting with Congressman Mark DeSaulnier and Secretary of State Alex Padilla, Walnut Creek, CA, 13 August 2018. <https://desaulnier.house.gov/media-center/press-releases/congressman-desaulnier-announces-town-hall-securing-our-elections>
248. Soil to Belly, Health from the Soil Up: A Soil Health to Human Health Learning Lab, Paicines Ranch, Paicines, CA, 9–12 August, 2018.
247. You want flies with that? Farm Biodiversity and Food Safety, Health from the Soil Up: Bridging the Silos of Health and Agriculture, Center for Occupational and Environmental Health, University of California, Berkeley, 9 August 2018. <https://www.stat.berkeley.edu/~stark/Seminars/flies18.pdf>
246. Lectures on Foundations of Statistics and Inference, Tokyo-Berkeley Data Science Boot-Up Camp, 9–19 July 2018, Graduate School of



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Mathematical Sciences, University of Tokyo, 9–19 July 2018. (3 lectures) Syllabus: <https://github.com/pbstark/basicsKavli18/blob/master/kavliStat18.pdf>

245. With Great Power Comes Great Responsibility: Multivariate Permutation Tests and Their Numerical Implementation, International Society for Nonparametric Statistics (ISNPS2018), Salerno, Italy, 11–15 June 2018. <https://www.stat.berkeley.edu/~stark/Seminars/prngISNPS18.slides.html>
244. Preproducibility, Reproducibility, Replicability: First Things First, Conference on Geodynamics and Big Data, Palau, Sardinia, 9–11 June 2018. <https://www.stat.berkeley.edu/~stark/Seminars/reproYuen18.htm>
243. Preproducibility, Reproducibility, Replicability: First Things First, All Souls College, University of Oxford, 29 May 2018. Slides: <https://www.stat.berkeley.edu/~stark/Seminars/reproOX18.htm>
242. Separating Signal from Noise: Measuring Gender Bias in Student Evaluations of Teaching, International Conference on Software Engineering, Gothenburg, Sweden, 27 May–3 June 2018. Slides: <https://www.stat.berkeley.edu/~stark/Seminars/setICSE18.htm>
241. Where the Wild Foods Are: Everywhere!, Nordic Food Lab, University of Copenhagen, Copenhagen, Denmark, 24 May 2018. Slides: <https://www.stat.berkeley.edu/~stark/Seminars/bosf18.pdf>
240. Wild and Feral Foods in the Mission District—and how to use them, Wildhawk, San Francisco, CA, 17 May 2018.
239. Don't bet on your random number generator, Department of Statistics and Data Science, University of Texas, Austin, TX 4 May 2018.
238. Student evaluations of teaching (mostly) do not measure teaching effectiveness, Simon Fraser University, Burnaby, BC, 26 April 2018. Slides: <https://www.stat.berkeley.edu/~stark/Seminars/setSFU18.htm> Video: <https://www.youtube.com/watch?v=5ha0jlfJDb8&feature=youtu.be>

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237. Public Engagement with Science, Molecular and Cell Biology 15, University of California, Berkeley, CA, 27 February 2018.
236. FoodInno: Wild Food, Statistics 98, University of California, Berkeley, 12 February 2018.
235. Quantifying Uncertainty in Inferences in Physics and Astronomy, Kavli IPMU–Berkeley Symposium “Statistics, Physics and Astronomy,” Kavli Institute for the Physics and Mathematics of the Universe, Tokyo, Japan, 11–12 January 2018. Slides: <https://www.stat.berkeley.edu/~stark/Seminars/uqKavli18.htm>
234. Teaching Evaluations (Mostly) Do Not Measure Teaching Effectiveness, American Association of Physics Teachers Winter Meeting, San Diego, CA, 6–9 January 2018. Slides: <https://www.stat.berkeley.edu/~stark/Seminars/setAAPT18.htm>
233. Big Data, Society, and Data Science Education, University of Hong Kong, Shenzhen Campus, Shenzhen, China, 29 December 2017. Slides: <https://www.stat.berkeley.edu/~stark/Seminars/bigDataHKUSZ17.pdf>
232. Big Data and Social Good, Institute for Geodesy and Geophysics, Wuhan, China, 27 December 2017.
231. Big Data, Quantifauxcation, and Cargo-Cult Statistics, Big Data Conference, China University of Geosciences, Wuhan, China, 26 December 2017.
230.  $P$ -values, Probability, Priors, Rabbits, Quantifauxcation, and Cargo-Cult Statistics, Statistics 159, Reproducible and Collaborative Data Science, University of California, Berkeley, CA, 14 November 2017. Slides: [https://www.stat.berkeley.edu/~stark/Seminars/rabbit\\_s157-17.ipynb](https://www.stat.berkeley.edu/~stark/Seminars/rabbit_s157-17.ipynb)
229. Opportunities in applied statistics: an  $n = 1$  observational study, Statistics Undergraduate Student Association (SUSA), University of California, Berkeley, CA, 30 October 2017.

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228. Don't Bet on Your Random Number Generator, Consortium for Data Analytics in Risk (CDAR) Annual Colloquium, University of California, Berkeley, CA, 27 October 2017. Slides: <https://www.stat.berkeley.edu/~stark/Seminars/prngCDAR17.slides.html>
227. Leave Election Integrity to Chance, *Science @ Cal*, University of California, Berkeley, CA, 21 October 2017.
226. Audits and Evidence-Based Elections, 2nd *Take Back the Vote Conference*, Berkeley, CA, 7–8 October 2017. Video: <https://www.youtube.com/watch?v=pPGTkgpjUU>
225. Wild And Feral Foods: Increasing Nutrition, Food Security, Farm Biodiversity, and Farm Revenue; Decreasing Herbicides, Water Use, and the Carbon Footprint of the Food System, *2nd AgroecoWeb—International Online Congress on Agro-ecology and Permaculture*, Brazil, 4–10 October 2017. Video: <https://vimeo.com/235073616>
224. How Statistics can improve election integrity, PoliSci 191, *The Right to Vote in America*, University of California, Berkeley, 4 October 2017.
223. Wild and Feral Food Identification Walk, ESPM 98, *Berkeley Urban Garden Internship (BUGI)*, University of California, Berkeley, 27 September 2017.
222. Urban Foraging and Gleaning, *FoodInno*, University of California, Berkeley, 16 September 2017.
221. ETAS-trophic failures: fit, classification, and forecasting, *Big Data in Geosciences: From Earthquake Swarms to Consequences of Slab Dynamics*, a conference in honor of Robert Geller, University of Tokyo, Tokyo, Japan, 25–27 May 2017. Slides: <https://www.stat.berkeley.edu/~stark/Seminars/gellerFest17.pdf>
220. Risk-Limiting Audits, *Global Election Technology Summit*, San Francisco, CA, 17 May 2017. <https://www.getsummit.org/>
219. Where the Wild Things Grow, *Berkeley Path Wanderers Association*, Berkeley, CA, 22 April 2017. <http://berkeleypaths.org/events/event/where-the-wild-things-grow-2/>

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218. Sometimes a Paper Trail Isn't Worth the Paper It's Written On, Keynote lecture, Workshop on Advances in Secure Electronic Voting, Financial Crypto 2017, Malta, 3–7 April 2017. Slides: <https://www.stat.berkeley.edu/~stark/Seminars/malta17.htm>
217. Don't Bet on Your Random Number Generator, Distinguished Lecture ([http://www.uni.lu/snt/distinguished\\_lectures](http://www.uni.lu/snt/distinguished_lectures)), Center for Security, Reliability, and Trust, University of Luxembourg, Luxembourg, 31 March 2017. Slides: <https://github.com/pbstark/pseudorandom/blob/master/prngLux17.ipynb>
216. Faculty-Student Feedback: End-of-Semester Teaching Evaluations, Dialogues, Center for Teaching and Learning, University of California, Berkeley, 20 March 2017. Slides: <https://www.stat.berkeley.edu/~stark/Seminars/setUCBDialogue17.htm>
215. Edible Weeds Tour of South Hayward, Seed Lending Library, Hayward Public Library, Weekes Branch, Hayward, CA, 11 March 2017. <http://www.libraryinsight.com/eventdetails.asp?jx=hzp&lmx=%C7cn%2D%AA%AE&v=3>
214. Risk-limiting Audits and Evidence-based Elections, Santa Clara County Citizens Advisory Committee on Elections, San Jose, CA, 7 March 2017. Slides: <https://www.stat.berkeley.edu/~stark/Seminars/santaClara17.pdf>
213. Causal Inference from Data, Emerging Science for Environmental Health Decisions, Workshop on Advances in Causal Understanding of Human Health Risk-Based Decision Making, National Academy of Sciences, Engineering, and Medicine, Washington, DC, 6–7 March 2017. Slides: <https://www.stat.berkeley.edu/~stark/Seminars/nasCause17.htm>
212. BRII and Brie, Berkeley Research Impact Initiative (BRII), University of California, Berkeley, CA 22 February 2017.
211. Uncertainty Quantification, Conférence Universitaire de Suisse Occidentale, Les Diablerets, Switzerland, 5–8 February 2017. Slides: <https://www.stat.berkeley.edu/~stark/Seminars/lesDiablerets17-1.pdf>, <https://www.stat.berkeley.edu/~stark/Seminars/lesDiablerets17-1.pdf>

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ars/lesDiablerets17-2.pdf, <https://www.stat.berkeley.edu/~stark/Seminars/lesDiablerets17-3.pdf>

210. Whose Votes (were) Counted in the Election of 2016?, ISF 198, *The 2016 U.S. Elections in Global Context: A Semester-Long Teach-In*, University of California, Berkeley, 24 January 2017. Slides: <https://www.stat.berkeley.edu/~stark/Seminars/teachIn17.pdf>
209. Invited panelist, “How Blockchain Technology Will and Won’t Change the World,” University of California, Berkeley, College of Letters and Sciences, hosted by Glynn Capital and Boost VC, San Mateo, CA, 30 November 2016.
208. Teaching Evaluations (Mostly) Do Not Measure Teaching Effectiveness, Distinguished Lecture Series, Department of Computer Science and Engineering, University of California, San Diego, San Diego, CA, 14 November 2016. Slides: <https://www.stat.berkeley.edu/~stark/Seminars/setUCSD16.htm>
207. Simple Random Sampling is not that Simple, *Random Processes And Time Series: Theory And Applications, A Conference In Honor Of Murray Rosenblatt*, UC San Diego, San Diego, CA, 21–23 October 2016.
206. Invited panelist, “Productive Ecologies in the Anthropocene: Foraging Systems,” *Sixth International Conference on Food Studies*, Berkeley, CA, 12–13 October 2016.
205. Teaching Evaluations (Mostly) Do Not Measure Teaching Effectiveness, Ethics Colloquium Series, Colorado State University, Fort Collins, CO, 3 October 2016. Slides: <https://www.stat.berkeley.edu/~stark/Seminars/setCSU16.htm> Video: <https://echo.colostate.edu/ess/echo/presentation/64309bd5-6afd-4394-b5d3-5e6748f545f1>
204. Simple Random Sampling is not that Simple, Neyman Seminar, Department of Statistics, University of California, Berkeley, Berkeley, CA 21 September 2016.
203. The Aliens Have Landed ... and They Are Delicious, *Visions of the Wild*, Vallejo, CA, 15 September 2016.

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202. Simple Random Sampling: Not So Simple, Section of Theoretical Computer Science, IT University of Copenhagen, Copenhagen, Denmark, 27 June 2016.
201. Simple Random Sampling: Not So Simple, Section of Mathematics, École Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland, 24 June 2016.
200. Invited panelist, “Carrot vs. Stick: approaches to encouraging reproducibility,” Moore-Sloan Data Science Environment Reproducibility Conference, New York University, New York, 3 May 2016.
199. Guest lecturer, MCB 15 (Public Understanding of Science), University of California, Berkeley, 12 April 2016.
198. Teaching Evaluations: Biased Beyond Measure, Center for Studies in Higher Education, and The Social Science Matrix, University of California, Berkeley, CA 11 April 2016. <https://www.stat.berkeley.edu/~stark/Seminars/setCSHE16.htm> Video: <https://www.youtube.com/watch?v=yhxUxBk-6GE>, <http://uctv.tv/shows/Teaching-Evaluations-Biased-Beyond-Measure-30870>
197. Teaching Evaluations (Mostly) Do Not Measure Teaching Effectiveness, Wharton Statistics Department, University of Pennsylvania, Philadelphia, PA, 17 March 2016. <https://www.stat.berkeley.edu/~stark/Seminars/setPenn16.htm>
196. Invited Panelist, “The potentials and pitfalls of electronic auditing,” Election Verification Network Conference: Securing Elections in the 21st Century, George Washington University, Washington, DC, 10–11 March 2016.
195. Invited Panelist, “Interoperability standards, proprietary codes, and verification/testing,” III Arnold Workshop: Reproducibility in Modeling and Code, American Association for the Advancement of Science, Washington, DC, 16–17 January 2016. <http://www.aaas.org/event/iii-arnold-workshop-modeling-and-code>
194. Teaching Evaluations (Mostly) Do Not Measure Teaching Effectiveness, Department of Applied Mathematics and Statistics, University of Cal-

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ifornia, Santa Cruz, 1 February 2016. <https://www.stat.berkeley.edu/~stark/Seminars/setUCSC16.htm>

193. A Noob's Guide to Reproducibility and Open Science, Department of Nuclear Engineering, Berkeley Institute for Data Science, and Berkeley Initiative for Transparency in Social Science, University of California, Berkeley, 25 January 2016. <https://www.stat.berkeley.edu/~stark/Seminars/reproNE16.htm> Video: <http://www.ustream.tv/recorded/81987743>
192. Chair, Wild Edibles Taste Workshop, 2015 Indigenous Terra Madre Conference, Shillong, Meghalaya, India, 3–7 November, 2015.
191. Invited Panelist, “From Field to Fork, the Stories of Chefs, Communities, and Writers,” 2015 Indigenous Terra Madre Conference, Shillong, Meghalaya, India, 3–7 November, 2015. <https://www.stat.berkeley.edu/~stark/Seminars/forageITM15.htm>
190. Guest lecturer, ESPM 117 (Urban Garden Ecosystems), University of California, Berkeley, 20 October 2015. <https://www.stat.berkeley.edu/~stark/Seminars/forageAgroEcol15.htm>
189. Invited Panelist, “Statistical Implications of Big Data Applied to Risk Modeling,” Consortium for Data Analytics in Risk (CDAR) Symposium, University of California, Berkeley, 16 October 2015. <http://cdar.berkeley.edu/events/2015cdarsymposium/>
188. Guest lecturer, Statistics 210A (Theoretical Statistics), University of California, Berkeley, 13–15 October 2015. <https://github.com/pbstark/Nonpar>
187. Risk-Limiting Audits and the Colorado Uniform Voting System Pilot, Colorado Pilot Election Review Committee Meeting, Office of the Colorado Secretary of State, Denver, CO, 9 October 2015. <https://www.stat.berkeley.edu/~stark/Seminars/auditC015.pdf>
186. Wild and Feral Food in EBRPD, East Bay Regional Park District Volunteer Meeting, Oakland, CA, 15 September 2015. <https://www.stat.berkeley.edu/~stark/Seminars/forageEBRPD15.htm>

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185. Probability and Statistics for Physical Science and Engineering PhD Students (a 15-hour course), University of Tokyo, 23–26 August 2015. Materials: <http://www.github.com/pbstark/PhysEng>
184. Statistics for Engineering PhD students (a 30-hour course), University of Padova, Padova, Italy, 29 June–7 July 2015. Materials: <http://www.github.com/pbstark/Padova15>
183. Pay no attention to the model behind the curtain, Significant Digits: Responsible Use of Quantitative Information, European Commission Joint Research Centre, Brussels, Belgium, 9–10 June 2015. <https://www.stat.berkeley.edu/~stark/Seminars/rabbitsBrux15.htm>
182. Reaping without Sowing: Wild Food and Urban Foraging, Berkeley Food Institute Seed Grant Forum, Berkeley, CA, 6 May 2015. <https://www.stat.berkeley.edu/~stark/Seminars/bfi-15-5-6.htm> Video: <http://food.berkeley.edu/seed-grant-forum/>
181. Invited panelist, Data Science: Supporting new Modes of Research, Annual Meeting of the Association of Research Libraries, Berkeley, CA, 28–30 April, 2015.
180. Teaching evaluations: class act or class action?, National Center for the Study of Collective Bargaining in Higher Education and the Professions, Annual Conference, Hunter College, New York, NY, 19–21 April 2015. <https://www.stat.berkeley.edu/~stark/Seminars/se tNCSCB15.htm>
179. Where the Wild Things Grow, Berkeley Path Wanderers Association, Berkeley, CA, 4 April 2015. <http://berkeleypaths.org/events/event/where-the-wild-things-grow/>
178. Invited panelist, Brave New Audits: How We Can Implement Risk-Limiting Audits with Today’s Machines, Off-the-Shelf Hardware, and Open Source Software, 2015 Election Verification Network Annual meeting, New Orleans, LA, 4–6 March 2015. <https://www.stat.berkeley.edu/~stark/Seminars/evn15.htm> Video: <https://youtu.be/DBcVicxJigs>



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177. Co-chair, Election Auditing, NIST / U.S. Election Administration Commission Future of Voting Systems Symposium II, Washington, DC, 9–10 February 2015.
176. Teaching evaluations: truthful or truthy?, European Commission Joint Research Centre *Third Lisbon Research Workshop on Economics, Statistics and Econometrics of Education*, Lisbon, Portugal, 23–24 January 2015. <http://cemapre.iseg.ulisboa.pt/educonf/3e3/> <https://www.stat.berkeley.edu/~stark/Seminars/setLisbon15.htm>
175. Bad Numbers, Bad Policy, 5th Impact Assessment Course by the Joint Research Centre and the Secretariat General of the European Commission, Brussels, Belgium, 20–21 January 2015. <https://ec.europa.eu/jrc/en/event/training-course/5th-impact-assessment-course> <https://www.stat.berkeley.edu/~stark/Seminars/fauxBrux15.htm>
174. Quantifauxcation, European Commission Joint Research Centre, Ispra, Italy, 19 January 2015. <https://www.stat.berkeley.edu/~stark/Seminars/fauxIspra15.htm>
173. Preproducibility for Research, Teaching, Collaboration, and Publishing, Replicability and Reproducibility of Discoveries in Animal Phenotyping, Tel Aviv University, Tel Aviv, Israel, 5–7 January 2015. <https://www.stat.berkeley.edu/~stark/Seminars/reproTAU15.htm> Video: [http://video.tau.ac.il/events/index.php?option=com\\_k2&view=item&id=5563:preproducibility-for-research-teaching-collaboration-and-publishing&Itemid=552](http://video.tau.ac.il/events/index.php?option=com_k2&view=item&id=5563:preproducibility-for-research-teaching-collaboration-and-publishing&Itemid=552)
172. Urban Foraging—Real Street Food, Discover Cal: A Menu for Change, Los Angeles, CA, 18 November 2014. <https://www.stat.berkeley.edu/~stark/Seminars/discoverCallA14.htm>
171. Guest lecturer, 6.S897/17.S952: Elections and Voting Technology, MIT, 13 November 2014.
170. Open Geospatial Data Down in the Weeds: Urban Foraging, Food Deserts, Citizen Science, Sustainability, and Reproducibility, Assessing

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- the Socioeconomic Impacts and Value of ‘Open’ Geospatial Information, The George Washington University, Washington DC, 28–29 October 2014. <https://www.stat.berkeley.edu/~stark/Seminars/openGeospatial14.htm>
169. Student Evaluations of Teaching, University of San Francisco, 23 October 2014. <https://www.stat.berkeley.edu/~stark/Seminars/setUSF14.htm>
168. Guest lecturer, CS 76N: Elections and Technology, Stanford University, 14 October 2014.
167. Statistical Evidence and Election Integrity, XXIX International Forum on Statistics, UPAEP, Puebla, Mexico, 29 September–3 October 2014. <https://www.stat.berkeley.edu/~stark/Seminars/foro14.pdf>
166. Nonparametric Inference, Auditing, and Litigation, Short course at XXIX International Forum on Statistics, UPAEP, Puebla, Mexico, 29 September–3 October 2014. <https://github.com/pbstark/MX14>
165. Invited participant, Pew Charitable Trusts roundtable: Challenges Related to the Voting Systems Marketplace, Chicago, IL, 8 September 2014.
164. Invited panelist, U.S. Election Assistance Commission roundtable: Expanding the Body of Knowledge of Election Administration—Reflections and Future Direction, 3 September 2014. [http://www.eac.gov/eac\\_grants\\_expanding\\_the\\_body\\_of\\_knowledge\\_of\\_election\\_administration\\_%E2%80%93reflections\\_and\\_future\\_direction/](http://www.eac.gov/eac_grants_expanding_the_body_of_knowledge_of_election_administration_%E2%80%93reflections_and_future_direction/)  
Video: <http://mediasite.yorkcast.com/webcast/Play/a90f223fa61940cd893b70fab55fe1b51d>
163. Reproducibility, Evidence, and the Scientific Method, Late-breaking session on Reproducibility, Joint Statistical Meetings, Boston, MA, 2–7 August 2014. <https://www.stat.berkeley.edu/~stark/Seminars/reproJSM14.htm>
162. Invited panelist, Big Data & Academic Libraries, International Alliance of Research Universities, 3rd Librarians’ Meeting, University of California, Berkeley, CA, 23–24 June 2014.

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161. Mini-Minimax Uncertainty Quantification for Emulators, 2nd Conference of the International Society for Nonparametric Statistics, Cadiz, Spain, 11–16 June 2014. <https://www.stat.berkeley.edu/~stark/Seminars/emulatorISNPS14.pdf>
160. Reproducible and Collaborative Statistical Data Science, Transparency Practices for Empirical Social Science Research, 2014 Summer Institute, University of California, Berkeley, CA, 2–6 June 2014. <https://www.stat.berkeley.edu/~stark/Seminars/bitss14.pdf>
159. Risk-Limiting Audits for Denmark and Mongolia, Third DemTech Workshop on Danish Elections, Trust, and Technology for the Mongolian General Election Commission, IT University of Copenhagen, Copenhagen, Denmark, 24 May 2014. <https://www.stat.berkeley.edu/~stark/Seminars/itu14.pdf>
158. How to Lie With Big Data (and/or Big Computations), Panel on Data Deluge or Drought (Quality and Quantity), MPE13+ Workshop on Global Change, DIMACS Special Program: Mathematics of Planet Earth 2013+, University of California, Berkeley, CA, 19–21 May 2014. <https://www.stat.berkeley.edu/~stark/Seminars/mpe14.pdf>
157. Invited panelist, Relying on Data Science: Reproducible Research and the Role of Policy, DataEDGE conference, UC Berkeley School of Information, Berkeley, CA, 8–9 May 2014.
156. Invited panelist, Some Tools and Solutions, University of Washington / Moore–Sloan First Reproducibility Workshop, eScience Institute, University of Washington, Seattle, WA, 8 May 2014 <https://www.stat.berkeley.edu/~stark/Seminars/reproUW14.pdf>
155. Some people have all the luck, Institute for Pure and Applied Mathematics, UCLA, Los Angeles, CA, 28 April 2014. (with Skip Garibaldi and Lawrence Mower) <http://www.ipam.ucla.edu/programs/PUBLIC/C2014/> Video: <https://www.youtube.com/watch?v=s8cHHWNb1A4>
154. Invited panelist, Ask a Statistician, SIAM/ASA/GAMM/AGU Conference on Uncertainty Quantification, Savannah, GA, 29 March – 3 April 2014.

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153. Invited panelist, The Reliability of Computational Research Findings: Reproducible Research, Uncertainty Quantification, and Verification & Validation, SIAM/ASA/GAMM/AGU Conference on Uncertainty Quantification, Savannah, GA, 29 March – 3 April 2014. <https://www.stat.berkeley.edu/~stark/Seminars/reproUQ14.pdf> Video: [http://client.blueskybroadcast.com/SIAM14/UQ/siam\\_uq14\\_MS42\\_3](http://client.blueskybroadcast.com/SIAM14/UQ/siam_uq14_MS42_3)
152. Invited panelist, New Paradigms for Voting Systems, 2014 Election Verification Network Annual meeting, San Diego, CA, 5–7 March 2014. <https://www.stat.berkeley.edu/~stark/Seminars/evn14NewParadigms.pdf> Video: <https://www.youtube.com/watch?v=bTlHYkiYBZI>
151. Invited panelist, End-to-End Verifiable Voting Roundtable, 2014 Election Verification Network Annual meeting, San Diego, CA, 5–7 March 2014. Video: [https://www.youtube.com/watch?v=jsGSQV\\_rFzA](https://www.youtube.com/watch?v=jsGSQV_rFzA)
150. Invited panelist, Improving Teaching through uncharted Waters: Peer Observation and other Approaches, Dialogues, a Colloquium Series on Teaching, Center for Teaching and Learning, University of California, Berkeley, 26 February 2014. <http://teaching.berkeley.edu/dialogues-colloquium-series-teaching>
149. Invited panelist, Unpacking the Voting Technology Debate, 2014 Voting and Elections Annual Summit, Overseas Vote Foundation and U.S. Vote Foundation, George Washington University, Washington, D.C., 30 January 2014. <https://www.overseasvotefoundation.org/initiatives-UOCAVASummit-summit2014-agenda> Video: <http://www.youtube.com/watch?v=UXqqnOWhsmA&list=PLtRB8fQ0zBR8Nza-G-RGln-HTrkp4UM6F&feature=share&index=1#t=23m30s>
148. Risk-Limiting Audits for Party-List Elections. IT University of Copenhagen, Copenhagen, Denmark, 21 November 2013. <https://www.stat.berkeley.edu/~stark/Seminars/itu13.pdf>
147. Selective Inference and Conditional Tests. Department of Statistics and Operations Research, Tel Aviv University, Tel Aviv, Israel, 28 October 2013.

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146. Ontology of Earthquake Probability: Metaphor. Dynamics of Seismicity, Earthquake Clustering and Patterns in Fault Networks, Statistical and Applied Mathematical Sciences Institute (SAMSI), Research Triangle Park, NC, 9–11 October 2013. <https://www.stat.berkeley.edu/~stark/Seminars/samsiSeis13.pdf>
145. Invited panelist, Innovations in On-line Learning, Designing a World University, World Academy Forum on Global Higher Education, Berkeley, California, 2–3 October 2013.
144. E2E to Hand-to-Eye: Verifiability, Trust, Audits, Vote ID 2013: The 4th International Conference on e-Voting and Identity, University of Surrey, Guildford, UK 17–19 July 2013. <https://www.stat.berkeley.edu/~stark/Seminars/voteID13.pdf>
143. Mini-Minimax Uncertainty of Emulators, Center for Security, Reliability, and Trust, University of Luxembourg, Luxembourg, 9 July 2013. <https://www.stat.berkeley.edu/~starkstark/Seminars/emulatorLux13.pdf>
142. Invited panelist, Extracting Actionable Insight From Dirty Time-Series Data, Berkeley Research Data Science Lectures, University of California, Berkeley, 21 June 2013. Video: <http://vcresearch.berkeley.edu/datascience/webcast-data-science-lecture-series-june-21>
141. Uncertainty quantification for emulators, Dipartimento di Fisica e Astronomia, Università di Bologna, Bologna, Italy, 5 June 2013. <https://www.stat.berkeley.edu/~stark/Seminars/emulatorUniBo13.pdf>
140. Leveraging Paper Ballots, Running Elections Efficiently, A Best Practices Convening, Common Cause – Common Cause / NY – Columbia University School of International and Public Affairs, Columbia University, New York, NY, 20 May 2013. <https://www.stat.berkeley.edu/~stark/Seminars/ccNY13.pdf>
139. Uncertainty quantification for emulators, University of California, Los Angeles, 11 April 2013. <https://www.stat.berkeley.edu/~stark/Seminars/emulatorUCLA13.pdf>
138. Brittle and Resilient Verifiable Voting Systems, Verifiable Voting Schemes Workshop: from Theory to Practice, Interdisciplinary Centre

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- for Security, Reliability and Trust, University of Luxembourg, Luxembourg 21–22 March 2013. <https://www.stat.berkeley.edu/~stark/Seminars/vv13.pdf>
137. Now What?, Election Verification Network Annual Conference, The Right to a Secure, Transparent and Accurate Election, Atlanta, Georgia 14–15 March 2013. <https://www.stat.berkeley.edu/~stark/Seminars/evn13nowWhat.pdf>
136. Machine-Assisted Transitive Audits, Election Verification Network Annual Conference, The Right to a Secure, Transparent and Accurate Election, Atlanta, Georgia 14–15 March 2013.
135. Risk-limiting Audits and Evidence-Based Elections in a Nutshell, Election Verification Network Annual Conference, The Right to a Secure, Transparent and Accurate Election, Atlanta, Georgia 14–15 March 2013. <https://www.stat.berkeley.edu/~stark/Seminars/evn13nutshell.pdf>
134. Reproducibility in Computational and Experimental Mathematics, ICERM, Brown University, Providence, RI, 10–14 December 2012. <http://icerm.brown.edu/tw12-5-rcem>
133. Whaddya know? Bayesian and Frequentist approaches to inverse problems, Inverse Problems: Practical Applications and Advanced Analysis, Schlumberger WesternGeco, Houston, TX, 12–15 November 2012. <https://www.stat.berkeley.edu/~stark/Seminars/swg12.pdf>
132. Evidence-Based Elections, E-Voting: Risk and Opportunity Conference, Center for Information Technology Policy, Princeton University, Princeton, NJ, 1 November 2012. <https://www.stat.berkeley.edu/~stark/Seminars/princeton12.pdf> Video: [http://youtu.be/1Z6JW1t\\_sFI](http://youtu.be/1Z6JW1t_sFI)
131. Evidence-Based Elections, Berkeley/Stanford Data, Society and Inference Seminar, Stanford University, Stanford, CA 8 October 2012. <https://www.stat.berkeley.edu/~stark/Seminars/dataSocietyInference12.pdf>
130. Voting Technology Exploratory Meeting, The Pew Charitable Trusts Center on the States, Santa Monica, CA 23–24 August 2012.

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129. Lightning Debates, Workshop on Electronic Voting Technology / Workshop on Transparent Elections, (EVT/WOTE '12), USENIX, Bellevue, WA, 6–7 August 2012. Video: <https://www.usenix.org/conference/ewtwote12/panel-2-title-tbd>
128. BRAVO: Ballot-polling Risk-limiting Audits to Verify Outcomes, Workshop on Electronic Voting Technology / Workshop on Transparent Elections, (EVT/WOTE '12), USENIX, Bellevue, WA, 6–7 August 2012. <https://www.stat.berkeley.edu/~stark/Seminars/evt12.pdf> Video: <https://www.usenix.org/conference/ewtwote12/s6-paper-title-tbd>
127. The Will of the People and the Luck of the Draw: Using Statistics to Limit the Risk of Wrong Electoral Outcomes, Joint Statistical Meetings, San Diego, CA, 29 July 2012. <https://www.stat.berkeley.edu/~stark/Seminars/jsm12.pdf>
126. Evidence-Based Elections, Risk-Limiting Audits, and Resilient Canvass Frameworks, SecVote 2012 Summer School on Secure Voting, Leibniz-Zentrum für Informatik, Schloss Dagstuhl, Germany, 16 July 2012. <https://www.stat.berkeley.edu/~stark/Seminars/dagstuhl12.pdf>
125. The Effectiveness of Internet Content Filters, Distinguished Lecture ([http://www.eni.lu/snt/distinguished\\_lectures](http://www.eni.lu/snt/distinguished_lectures)), Center for Security, Reliability, and Trust, University of Luxembourg, Luxembourg, 13 July 2012. <https://www.stat.berkeley.edu/~stark/Seminars/luxembourg12.pdf>
124. Evidence-Based Elections, International Association of Clerks, Recorders, Election Officials & Treasurers (IACREOT) annual conference, Albuquerque, NM, 30 June 2012. <https://www.stat.berkeley.edu/~stark/Seminars/iacreot12.pdf>
123. Confidence Limits, Progress on Statistical Issues in Searches, SLAC National Accelerator Laboratory, Stanford, CA, 4–6 June 2012. <https://www.stat.berkeley.edu/~stark/Seminars/slac12.pdf>
122. UQQ, UQ: Transition Workshop, Statistical and Applied Mathematical Sciences Institute (SAMSI), Research Triangle Park, NC, 21–23 May

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2012. <https://www.stat.berkeley.edu/~stark/Seminars/samsi12.pdf>
121. Testing for Poisson Behavior, Seismological Society of America Annual Meeting, San Diego, CA, 17–19 April 2012. <https://www.stat.berkeley.edu/~stark/Seminars/ssa12.pdf>
120. Get Out The Audit (GOTA), Election Verification Network Annual Conference, Santa Fe, NM, 29–30 March 2012. <https://www.stat.berkeley.edu/~stark/Seminars/evnGOTA12.pdf>
119. The Long View: Evidence-Based Elections, Election Verification Network Annual Conference, Santa Fe, NM, 29–30 March 2012. <https://www.stat.berkeley.edu/~stark/Seminars/evnLongView12.pdf>
118. The Will of the People and the Luck of the Draw: Risk-Limiting Audits and Resilient Canvass Frameworks, San Francisco Chapter of the American Statistical Association, Berkeley, CA, 16 February 2012. <https://www.stat.berkeley.edu/~stark/Seminars/asa12.pdf>
117. Evidence-Based Elections: Colorado’s Future?, Colorado Elections Best Practices & Vision Commission, Denver, CO, 14 December 2011. <https://www.stat.berkeley.edu/~stark/Seminars/co-11-12-14.pdf> Audio: <mms://pub.sos.state.co.us/20111214130705B>
116. From the Virtual Trenches, *Letters and Sciences Colloquium on Undergraduate Education: The Virtual University—Challenges and Opportunities*, University of California, Berkeley, CA, 16 November 2011. <http://ls.berkeley.edu/stories/archive/fall-2011-colloquium-undergraduate-education-0> <https://www.stat.berkeley.edu/~stark/Seminars/onlineEd11.pdf> Video: <http://www.youtube.com/watch?v=40vGDuPSJso>
115. Earthquake Clustering and Declustering, Institute de Physique du Globe de Paris, Paris, France, 4 October 2011. <https://www.stat.berkeley.edu/~stark/Seminars/ipg11.pdf>
114. Fears, Predictions, Hopes & Plans, *Panel on the Future*, Election Integrity: Past, Present, and Future, Caltech/MIT Voting Technology Project, Cambridge, MA, 1 October 2011. <https://www.stat.berke>



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ley.edu/~stark/Seminars/mit11.pdf Video: <http://techtv.mit.edu/collections/vtp/videos/14802-eippf-2011-3-the-future>

113. Risk-limiting Audits: Soup to Nuts, and Beyond, Workshop on Electronic Voting Technology / Workshop on Transparent Elections, (EVT/WOTE '11), USENIX, San Francisco, CA, 9 August 2011. <https://www.stat.berkeley.edu/~stark/Seminars/evtrLA11.pdf>
112. SOBA: Secrecy-preserving Observable Ballot-level Audit, Workshop on Electronic Voting Technology / Workshop on Transparent Elections, (EVT/WOTE '11), USENIX, San Francisco, CA, 9 August 2011. <https://www.stat.berkeley.edu/~stark/Seminars/evtSoba11.pdf>
111. The Effectiveness of Internet Content Filtering, Workshop on Free and Open Communication on the Internet (FOCI '11), USENIX, San Francisco, CA, 8 August 2011. <https://www.stat.berkeley.edu/~stark/Seminars/foci11.pdf>
110. SticiGui, Onsophic, and Statistics W21, Panel on online instruction, Joint Statistical Meetings, Miami Beach, FL, 31 August 2011. <https://www.stat.berkeley.edu/~stark/Seminars/jsm11.pdf>
109. Risk Limiting Audits, Colorado Secretary of State, Colorado Risk Limiting Audit (CORLA) Kick-off Meeting, Denver, CO, 16 June 2011. <https://www.stat.berkeley.edu/~stark/Seminars/co-11-6-16.pdf>
108. Simultaneous Confidence Intervals with more Power to Determine Signs, Conference in honor of Erich Lehmann, Rice University, Houston, TX, 12 May 2011. <https://www.stat.berkeley.edu/~stark/Seminars/lehmann11.pdf>
107. Close enough for government [to] work, Verified Voting Foundation, Palo Alto, CA, 27 April 2011. <https://www.stat.berkeley.edu/~stark/Seminars/vv-11-4-27.pdf>
106. Close enough for government [to] work: Risk-limiting post-election audits, Berkeley-Stanford Joint Statistics Colloquium, Stanford University, Stanford, CA, 12 April 2011. <https://www.stat.berkeley.edu/~stark/Seminars/stanford11.pdf>

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105. Audits: The After-Math of Elections, Verify early, verify often: creating secure, transparent and accurate elections, Election Verification Network, Chicago, IL, 25–26 March 2011. <https://www.stat.berkeley.edu/~stark/Seminars/reed11.pdf>
104. Simultaneous Confidence Intervals with more Power to Determine Signs, Department of Mathematics, Reed College, Portland, OR, 10 March 2011. <https://www.stat.berkeley.edu/~stark/Seminars/reed11.pdf>
103. Close enough for government work: Risk-Limiting Post-Election Audits, Wharton Statistics Department, University of Pennsylvania, Philadelphia, PA, 26 January 2011. <https://www.stat.berkeley.edu/~stark/Seminars/penn11.pdf>
102. Audits: The After-Math of Election Reform, Conference on Innovative Electoral Reforms and Strategies, Washington, DC, 10–11 December 2010. <https://www.stat.berkeley.edu/~stark/Seminars/innovative10.pdf>
101. Risk-Limiting Post-Election Audits: Statistics, Policy, and Politics, Department of Statistics, Rice University, Houston, TX, 1 November 2010. <https://www.stat.berkeley.edu/~stark/Seminars/rice10.pdf>
100. Are Declustered Earthquake Catalogs Poisson?, Department of Statistics, Pennsylvania State University, State College, PA, 14 October 2010. <https://www.stat.berkeley.edu/~stark/Seminars/psu10.pdf>
99. Super-simple simultaneous single-ballot risk-limiting audits, 2010 Electronic Voting Technology Workshop / Workshop on Trustworthy Elections (EVT/WOTE '10), Washington, DC, 9–10 August 2010. <https://www.stat.berkeley.edu/~stark/Seminars/ewtote10.pdf>
98. AB 2023 and Risk-Limiting Audits, California Association of Clerks and Election Officials Legislative Committee Meeting, 14 May 2010. <https://www.stat.berkeley.edu/~stark/Seminars/caceo-legis10.pdf>
97. Justice and inequalities, Department of Statistics and Operations Research, Tel Aviv University, Tel Aviv, Israel, 13 April 2010. <https://www.stat.berkeley.edu/~stark/Seminars/tau10.pdf>

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96. Size Matters: Smaller Batches Yield More Efficient Risk-Limiting Audits, Small-Batch Audit Meeting, Washington, DC, 27–28 March 2010. <https://www.stat.berkeley.edu/~stark/Seminars/smallBatch10.pdf>
95. Sexy Audits and the Single Ballot, Election Verification Network (EVN) annual conference, Washington, DC, 25–27 March 2010. <https://www.stat.berkeley.edu/~stark/Seminars/evn10.pdf>
94. Simple, Affordable, Post-Election Audits, Institute for Mathematical Behavioral Sciences, University of California, Irvine, CA, 7 January 2010. <https://www.stat.berkeley.edu/~stark/Seminars/uci10.pdf>
93. Efficient Post-Election Audits of Multiple Contests: 2009 California Tests, Conference on Empirical Legal Studies, University of Southern California Gould School of Law, Los Angeles, CA, 20–21 November 2009. <https://www.stat.berkeley.edu/~stark/Seminars/cels09.pdf>
92. Risk-Limiting Audits, Audit Working Meeting, American Statistical Association, Arlington, VA, 23–24 October 2009. <https://www.stat.berkeley.edu/~stark/Seminars/asa09.pdf>
91. Invited panelist, Uncertainty Quantification and Error Analysis, Scientific Grand Challenges in National Security: the Role of Computing at the Extreme Scale, Washington, DC, 6–8 October 2009.
90. Some Ado about (mostly) Nothing: zero-dominated data, Alameda County Workshop on Avian Mortality at Altamont, Emeryville, CA, 22 September 2009. <https://www.stat.berkeley.edu/~stark/Seminars/altamont09.pdf>
89. Freedman’s Dialogue with the Social Sciences, 2009 Joint Statistical Meetings, Washington, DC, 5 August 2009.
88. Invited panelist, David A. Freedman’s Dialogue with the Social Sciences, The Society for Political Methodology 26th Annual Summer Meeting, Institution for Social and Policy Studies, Yale University, New Haven, CT, 23 July 2009.

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87. Election Auditing: How Much is Enough?, The Society for Political Methodology 26th Annual Summer Meeting, Keynote lecture, Institution for Social and Policy Studies, Yale University, 23 July 2009. <http://www.stat.berkeley.edu/~stark/Seminars/polMeth09.pdf>
86. Risk-Limiting Post-Election Audits, Department of Statistics, University of California, Berkeley, CA, 31 March 2009. <https://www.stat.berkeley.edu/~stark/Seminars/ucb09.pdf>
85. Uncertainty Quantification Qualification, Lawrence Livermore National Laboratory, Livermore, CA, 26 March 2009. <https://www.stat.berkeley.edu/~stark/Seminars/llnl09.pdf>
84. 2008 Risk-limiting Audits in California, The Pew Charitable Trusts Audit Workshop, Salt Lake City, UT, 23–24 February 2009. <https://www.stat.berkeley.edu/~stark/Seminars/pew09.pdf>
83. Election Auditing and Nonparametric Confidence Bounds, Department of Mathematics, Reed College, Portland, OR, 20 November 2008. <https://www.stat.berkeley.edu/~stark/Seminars/reed08.pdf>
82. Risk-Limiting Post-Election Audits, Department of Statistics, Kansas State University, Manhattan, KS, 2 October 2008. <https://www.stat.berkeley.edu/~stark/Seminars/ksu08.pdf>
81. CAST: Canvass Audits by Sampling and Testing, 2008 American Political Science Association Annual Meeting, Panel 2008MP04292: Catch Me If You Can: Techniques to Detect Electoral Fraud, Boston, MA, 28–31 August 2008. <https://www.stat.berkeley.edu/~stark/Seminars/apsa08.pdf>
80. Invited panelist, Joint Statistical Meetings session, Statistical Measures Can Help Restore Confidence in U.S. Elections, Denver, CO, 3–7 August 2008.
79. Invited Panel on Post-Election Auditing: The Academic & Advocacy Perspective, California Association of Clerks and Election Officials (CACEO) 100th Anniversary Celebration Conference, Long Beach, CA, 8–11 July 2008.

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78. Statistical Audits: Why and How Much?, Invited Panel on Post-Election Auditing: Practical Experience and Best Practices, California Association of Clerks and Election Officials (CACEO) 100th Anniversary Celebration Conference, Long Beach, CA, 8–11 July 2008. <https://www.stat.berkeley.edu/~stark/Seminars/caceo08.pdf>
77. Invited Panel on Online Learning, UC21st Century, Teaching, Learning and Technology: Past, present and future, University of California, Davis, 20–21 June 2008.
76. SticiGui—What is it?, Department of Statistics, University of California, Los Angeles, CA, 29 May 2008. <https://www.stat.berkeley.edu/~stark/Seminars/ucla08.pdf>
75. Election Auditing: How Much Is Enough?, Mathematical Sciences Research Institute, Annual Meeting of Academic Sponsors and Steering Committee, Berkeley, CA, 7 March 2008. <https://www.stat.berkeley.edu/~stark/Seminars/msri08.pdf>
74. Invited panelist, 2007 Post Election Audit Summit, Minneapolis, MN, 25–27 October 2007. <https://www.stat.berkeley.edu/~stark/Seminars/peaSummit07.pdf>
73. Urning Voter Confidence, Department of Mathematics, Reed College, Portland, OR, 11 October 2007. <https://www.stat.berkeley.edu/~stark/Seminars/reed07.pdf>
72. Frequentist Methods in Inverse Problems, Sandia CSRI Workshop on Large-Scale Inverse Problems and Quantification of Uncertainty, Santa Fe, NM, 10–12 September 2007. <https://www.stat.berkeley.edu/~stark/Seminars/sandia07.odp>
71. How Statistics Helps, 9th US Congress on Computational Mechanics, San Francisco, CA, 22–26 July 2007. <https://www.stat.berkeley.edu/~stark/Seminars/compMech07.odp>
70. Nonparametrics: nonpareil?, Veterans Administration Hospital, Neuropsychology Brown Bag Lunch, Martinez, CA, 15 May 2007. <https://www.stat.berkeley.edu/~stark/Seminars/ebire-5-15-07.pdf>

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69. The Null Hypothesis: Are Earthquakes Predictable?, Assessment schemes for earthquake prediction, Royal Astronomical Society/Joint Association for Geophysics Discussion Meeting 7–8 November 1996, the Geological Society, London
68. Shaking Down Earthquake Predictions, Department of Statistics, University of California, Davis, 25 May 2006 <https://www.stat.berkeley.edu/~stark/Seminars/ucd-5-25-06.pdf>
67. Measuring Resolution in Nonlinear and Constrained Inverse Problems, Workshop on Statistical Inverse Problems, Institute for Mathematical Stochastics, Göttingen, Germany, 23–25 March 2006. [http://www.num.math.uni-goettingen.de/gk/?Workshops:Workshop\\_on\\_Statistical\\_Inverse\\_Problems](http://www.num.math.uni-goettingen.de/gk/?Workshops:Workshop_on_Statistical_Inverse_Problems)
66. Resolution in Nonlinear and Constrained Inverse Problems, Workshop on Computational and Mathematical Geoscience, Colorado School of Mines, Golden CO, 15–17 June 2005.
65. Quantifying uncertainty in inverse problems, Summer school: Mathematical Geophysics and Uncertainty in Earth Models, Colorado School of Mines, Golden CO, 14–25 June 2004. <https://www.stat.berkeley.edu/~stark/Seminars/mines04.pdf>
64. Estimating power spectra of galaxy structure: can Statistics help?, Penetrating bars through masks of cosmic dust: the Hubble tuning fork strikes a new note, Pilanesberg National Park, South Africa, 7–12 June 2004. <http://www.stat.berkeley.edu/~stark/Seminars/bars04.ppt>
63. Quantifying uncertainty in inverse problems, Institute for Pure and Applied Mathematics (IPAM) Conference on Statistical Methods for Inverse Problems, IPAM, Los Angeles, CA, 5–6 November 2003. <http://www.stat.berkeley.edu/~stark/Seminars/ipam03.ppt>
62. Using what we know: inference with physical constraints, PhysStat 2003: Statistical Problems in Particle Physics, Astrophysics and Cosmology, Stanford Linear Accelerator Center, Stanford, CA, 8–10 September 2003. <https://www.stat.berkeley.edu/~stark/Seminars/phyStat03.pdf>

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61. Statistical Approaches to Inverse Problems. Danish Interdisciplinary Inversion Group Seminars on Inverse Problems: Insight and Algorithms. Niels Bohr Institute, Copenhagen University, Copenhagen, Denmark, 27–29 May 2002. <https://www.stat.berkeley.edu/~stark/Seminars/bohr02.ppt>
60. Statistical Measures of Uncertainty in Inverse Problems. Institute for Mathematics and its Applications Tutorial on Inverse Problems and the Quantification of Uncertainty, Annual Program Mathematics in the Geosciences, Minneapolis, MN, 19 March 2002. <https://www.stat.berkeley.edu/~stark/Seminars/ima02.ppt>
59. Data Errors, Model Errors, and Estimation Errors, Frontiers of Geophysical Inversion Workshop, Waterways Experiment Station, U.S. Army Corps of Engineers Engineer Research and Development Center, Vicksburg, MS, 17–19 February 2002. <https://www.stat.berkeley.edu/~stark/Seminars/wes02.ppt>
58. Strategic Planning and Implementation I: The Challenge of Adapting Organizations and Creating Partnerships to Target New Markets, University Teaching as E-business?, Center for Studies in Higher Education, Berkeley, CA, 26–27 October 2001.
57. Inverse Problems and Data Errors, New Developments in Astrophysical Fluid Dynamics, Chateau de Mons, Caussens, France, 25–29 June 2001.
56. Data Reduction and Inverse Problems in Helioseismology, Workshop Statistics of inverse problems, Institut Henri Poincaré, Paris, France, 28–29 May 2001.
55. Why Statistics is worth the Stigma, Letters and Sciences Faculty Forum, University of California, Berkeley, CA, 23 April 2001. <https://www.stat.berkeley.edu/~stark/Seminars/stigma01.ppt>
54. Inverse Problems in Helioseismology, Second MaPhySto Workshop on Inverse Problems: Inverse problems from a Statistical Perspective, Aalborg, Denmark, 28–31 March 2001.
53. What are the Chances?, NATO Advanced Research Workshop: State of scientific knowledge regarding earthquake occurrence and implications

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for public policy, Le Dune, Piscinas — Arbus, Sardinia, Italy, 15–19 October 2000.

52. Why Unadjusted Census Results should be Used for Reapportionment and Funding within the State of California, 13th Annual Demographic Workshop, U.S. Bureau of the Census, California State Census Data Center, and the Population Research Laboratory of the University of Southern California, Los Angeles, CA, 15 May 2000.
51. Invited discussant, Workshop of the National Academy of Sciences Panel to Review the 2000 Census, Washington, D.C., 2–3 February 2000.
50. Invited discussant, Panel discussion on the role of sampling in the US Census, San Francisco Bay Area Chapter of the American Statistical Association, 20 December 1999.
49. Lecturer, Mathematical Geophysics Summer School, Stanford University, Stanford, CA, 2–20 August 1999.
48. Less Asymptotic Tomography. 9th SOHO Workshop: Helioseismic Diagnostics of Solar Convection and Activity, Stanford University, Stanford, CA, 12–15 July 1999.
47. Invited panelist, Reinventing Undergraduate Education: Technology Enhanced Learning in the Sciences, Math, and Engineering, University of California, Berkeley, CA, 23 April 1999.
46. Error in Numerical Models Fitted to Data. DSRC/DARPA Study on Numerical Simulation of Physical Systems: The State of the Art, and Opportunities for Further Advances, Kick-Off Meeting, Arlington, VA, 19–20 January 1999. <https://www.stat.berkeley.edu/~stark/Seminars/dsrc99.htm>
45. Sampling to Adjust the U.S. Census. Miller Institute for Basic Research in Science, University of California, Berkeley, CA, 12 January 1999. <https://www.stat.berkeley.edu/~stark/Seminars/mibrs99.htm>
44. A Statistician’s Perspective on Census Adjustment, Berkeley Breakfast Club, Berkeley, CA, 5 December 1998. <https://www.stat.berkeley.edu/~stark/Seminars/bbc98.htm>



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43. SticiGui: Melts in your Browser, not in your Brain, Joint Berkeley-Stanford Statistics Colloquium, Department of Statistics, Stanford University, Stanford, CA, 27 October 1998. <https://www.stat.berkeley.edu/~stark/Seminars/bsc98.htm>
42. SticiGui: Statistics Tools for Internet and Classroom Instruction with a Graphical User Interface, 1998 Joint Statistical Meetings of the American Statistical Association, International Biometric Society, and Institute of Mathematical Statistics, Orlando, FL, 12 August 1998.
41. Presidential Panel on Statistics in Public Policy, 1998 Joint Statistical Meetings of the American Statistical Association, International Biometric Society, and Institute of Mathematical Statistics, Orlando, FL, 10 August 1998.
40. Misfit Measures and Statistical Inconsistency in Linear Inverse Problems. AMS/IMS/SIAM Joint Summer Research Conferences in the Mathematical Sciences, Mathematical Methods in Inverse Problems for Partial Differential Equations, Mt. Holyoke, MA, 4–9 July 1998. <https://www.stat.berkeley.edu/~stark/Seminars/ams-ims-siam-98.pdf>
39. Uncertainties for functions from incomplete, erroneous data. NSF/DOE Workshop on Uncertainty in Modeling, National Science Foundation, Arlington, VA, 11–12 June 1998. <https://www.stat.berkeley.edu/~stark/Seminars/nsf-doe-98.htm>
38. Sampling to adjust the 1990 Census for Undercount. U.S. House of Representatives Subcommittee on the Census, May 1998. <https://www.stat.berkeley.edu/~stark/Census/house-5-5-98-pbs.pdf>
37. Sounding the Sun: Helioseismology. 1998 American Association for the Advancement of Science (AAAS) Annual Meeting and Science Innovation Exposition, Philadelphia, PA., February 1998. <https://www.stat.berkeley.edu/~stark/Seminars/Aaas/helio.htm>
36. Data Sampling Rate Reduction for the OERSTED geomagnetic Satellite, Department of Geological Sciences, Stanford University, Stanford, CA, 28 July 1997. <https://www.stat.berkeley.edu/~stark/Preprints/Oersted/writeup.htm>

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35. Does God play dice with the Earth, and if so, are they loaded? Fourth SIAM Conference on Mathematical and Computational Methods in the Geosciences, Albuquerque, NM, 16 June 1997. <https://www.stat.berkeley.edu/~stark/Seminars/doesgod.htm>
34. Solving Problems for a Large Statistics Lecture Course using a Website UC Berkeley Academic Senate Workshop on Classroom Technology, Berkeley, CA, 11 April 1997. <https://www.stat.berkeley.edu/~stark/Seminars/itpTalk.htm>
33. Deficiencies of the simple theories, Local Helioseismology Workshop, University of Cambridge, Cambridge, England, 1997.
32. CMB's, Royal Astronomical Society Ordinary Meeting, London, England, 1996.
31. The Null Hypothesis, Royal Astronomical Society and Joint Associations for Geophysics discussion meeting on Assessment of Schemes for Earthquake Prediction, London, England, 1996.
30. On the consistency of multiple inference in inverse problems using  $l_p$  confidence sets, International Conference on Multiple Comparisons, Tel Aviv, Israel, 1996.
29. Confidence Intervals in Inverse Problems, Conference in Honor of George Backus, Institute for Geophysics and Planetary Physics, La Jolla, CA, 1995.
28. The Need for Wave-Equation Travel-Time Tomography, Institute for Mathematics and Its Applications, Conference on Tomography, Minneapolis, MN, 1995.
27. Inference, Prior Information, and Misfit Measures, Interdisciplinary Inversion Conference on Methodology, Computation and Integrated Applications, University of Aarhus, Aarhus, Denmark, 1995.
26. Optimization and Inference in Travel-Time Seismology, National Research Council Board on Mathematical Sciences Symposium on Mathematical Sciences in Seismology, Washington, DC, 1995.

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25. Prior Information and Confidence Intervals in Inverse Problems, International Union of Geodesy and Geophysics Meeting, Boulder, CO, 1995.
24. Something AGAINST Nothing: A Confidence Game, Joint Statistical Meetings of the American Statistical Association, International Biometric Society, and Institute of Mathematical Statistics, Orlando, FL, 1995.
23. Uncertainties in Travel-Time Seismology, SIAM/GAMM Symposium on Inverse Problems: Geophysical Applications, Fish Camp, CA, 1995.
22. Toward Tubular Tomography, 27th General Assembly of the Int. Assoc. of Seismology and Phys. of the Earth's Inter. (IASPEI), Wellington, New Zealand, 1994.
21. Alternative Data Analysis Techniques, Global Oscillation Network Group annual meeting, Los Angeles, CA, (presented by C. Genovese due to illness), 1994.
20. Mathematical Aspects of Integral Equation Inversion, Global Oscillation Network Group workshop, Sydney, Australia, 1994.
19. Conservative Finite-Sample Confidence Envelopes for Monotone and Unimodal Densities, Mathematisches Forschungsinstitut Oberwolfach meeting on Curves, Images and Massive Computation, Oberwolfach, Germany, 1993.
18. Invited discussant, Joint IMS/ASA/ENAR Meeting, Philadelphia, PA, 1993.
17. Uncertainty of the Quadrupole Component of the Cosmic Microwave Background, Israel Statistical Association Annual Meeting, Tel Aviv, 1993.
16. Brute-Force Minimax Estimation in Geochemistry, Joint Statistical Meetings of the American Statistical Association, International Biometric Society, and Institute of Mathematical Statistics, San Francisco, CA, 1993.

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15. Conservative Numerical Uncertainty Estimates in Inverse Problems, SIAM 40th Anniversary Meeting, Los Angeles, CA, 1992.
14. Minimax Estimation in Geomagnetism, European Geophysical Society Annual Meeting, Wiesbaden, Germany, 1991.
13. Minimax Estimation in Geophysical Inverse Problems: Applications to Seismic Tomography and Geomagnetism, Schmitt Institute for Physics of the Earth, Academy of Sciences of the USSR, Moscow, 1991.
12. Imagining Earth's Interior: Controversies in Seismology and Geomagnetism, Mathematical Sciences Research Institute Workshop on Statistical Methods in Imaging, Berkeley, CA, 1991.
11. Discretization and its Discontents: New Methods in Inverse Theory, Institute for Theoretical Physics program Helioseismology—Probing the Interior of a Star, National Science Foundation Institute for Theoretical Physics, University of California, Santa Barbara, 1990.
10. Inference in Infinite-Dimensional Inverse Problems, Schmitt Institute for Physics of the Earth, Academy of Sciences of the USSR, Moscow, 1990.
9. Inference in Infinite-Dimensions: Discretization and Duality, Israel Statistical Association Annual Meeting, Jerusalem, 1990.
8. Superresolution: What, When and How?, Institute for Theoretical Physics program Helioseismology—Probing the Interior of a Star, National Science Foundation Institute for Theoretical Physics, University of California, Santa Barbara, 1990.
7. Sparsity-Constrained Deconvolution, International Union of Radio Science Meeting, Boulder, CO, 1989.
6. Invited discussant, Statistics, Earth and Space Sciences Meeting of the Bernoulli Society, Leuven, Belgium, 1989.
5. Rigorous Computer Solutions to Infinite-Dimensional Inverse Problems, rcp 264 problemes inverses, Montpellier, France, 1989.
4. Duality and Discretization Error, Conference on Mathematical Geophysics, Blanes, Spain, 1988.

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3. Spectral extrapolation with positivity, International Union of Radio Science Meeting, Boulder, CO, 1987.
2. Travel-Time Constraints on Core Structure, Special Session on Geophysics of the Core and Core-Mantle Boundary, American Geophysical Union Spring Meeting, Baltimore, MD, 1986.
1. Smooth Models from  $\tau(p)$  and  $X(p)$  Data, Scripps Industrial Associates Short Course on Inverse Theory, Scripps Institution of Oceanography, La Jolla, CA, 1986.

### **Other Invited Seminars**

California State University, Chico (Mathematics 1993)

Colorado School of Mines (Mathematical and Computer Sciences 1997)

Copenhagen University (Niels Bohr Institute for Astronomy, Physics, and Geophysics 1996)

Hebrew University of Jerusalem (Statistics 1993)

IT University of Copenhagen (2013, 2014, 2016)

Kansas State University (Statistics 2008)

Pennsylvania State University (Statistics 2010)

National Solar Observatory (1997)

Naval Postgraduate School (Operations Research, 2001)

Reed College (Mathematics, 2007, 2008, 2011)

Rice University (Statistics, 2010)

Schlumberger-Doll Research (1988, 1990, 1991, 1992)

Southern Methodist University (Statistical Sciences, 1998)

Stanford University (Center for Space Physics and Astrophysics 1992; Mathematics 1997; Geology and Geophysics 1993, 1997; Statistics 1988, 1993, 1995, 2011, 2018; Computer Science 2019)

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The Technion (Statistics 1987)

Tel Aviv University (Geology and Geophysics 1988, 1991; Statistics 1991, 2010)

University of Bologna (Physics and Astronomy, 2013)

University of British Columbia (Geophysics and Astronomy 1996)

University of California, Berkeley (Astronomy 1996; Center for Pure and Applied Mathematics 1988; Geology and Geophysics 1988; Materials Science and Mineral Engineering 1988; Physics, 2001; Seismographic Stations, 1991, 1992, 1996; Statistics 1987, 1988(2),1989(2), 1990, 1991, 1992, 1994, 1996(2), 1997, 2006, 2009, 2011)

University of California, Davis (Statistics 1995, 2006; Mathematics 2000)

University of California, Los Angeles (Mathematics 1992; Statistics 2000, 2008, 2013)

University of California, Riverside (Earth Sciences 1996; Statistics 1996)

University of California, San Diego (Institute for Geophysics and Planetary Physics 1985, 1986, 1987, 1988(2), 1990, 1998, 2005; Mathematics 1994)

University of Cambridge (Institute for Astronomy 1992, 1997)

University of Chicago (Statistics 1990)

University of Edinburgh (Earth Sciences, 1998)

University of Luxembourg (Interdisciplinary Centre for Security, Reliability and Trust 2012)

University of Paris, Institute de Physique du Globe de Paris (2011)

University of Pennsylvania (Wharton Statistics Department, 2011, 2016)

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University of Texas at Austin (Geological Sciences 1988; Mathematics 1990, 1991; Institute for Geophysics 1990)

Veterans Affairs Northern California Health Care System, Martinez, CA (East Bay Institute for Research and Education, 2007)

Yale University (Geology and Geophysics 1988; Statistics 1988)

## Press

296. 'Weaponizing Uncertainty': Another GOP State 'Audit' of 2020 Results Finds...Nothing Unusual, Brad Friedman, *BradCast*, 4 January 2022, <https://bradblog.com/?p=14123>
295. AHA News: Foraging for Food Connects You to Nature—But Do Your Homework Before You Eat, Will Pry, *American Heart Association News, USA Today*, 2 December 2021. <https://www.usnews.com/news/health-news/articles/2021-12-02/aha-news-foraging-for-food-connects-you-to-nature-but-do-your-homework-before-you-eat>
294. New Hampshire showed how to audit an election properly, Sarah Salem, *The Cybersecurity 202, The Washington Post*, 5 October 2021. <https://www.washingtonpost.com/politics/2021/10/05/new-hampshire-showed-how-audit-an-election-properly/>
293. DHS Cyber Office Wants to See Secret Voting Machine Vulnerability Report, Shannon Vavra and Jose Pagliery, *The Daily Beast*, 28 September 2021. <https://www.thedailybeast.com/department-of-homeland-security-cyber-office-wants-to-see-secret-voting-machine-vulnerability-report>
292. Fact check: No evidence 'lost votes' or 'ghost votes' affected Arizona's election outcome, Daniel Funke, *USA TODAY*, 15 September 2021. <https://www.usatoday.com/story/news/factcheck/2021/09/15/fact-check-arizona-voter-fraud-not-proven-viral-canvassing-report/8262315002/>

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291. Experts call for rigorous audit to protect California recall, Christina A. Cassidy and Kate Brumback, *Associated Press*, 2 September 2021. <https://apnews.com/article/technology-california-4e0e59da8bd5618c653b3e3fab524d2e>
290. The Cybersecurity 202: In this Colorado county, election conspiracies led to a real-world leak, Joseph Marks, *The Washington Post*, 26 August 2021. <https://www.washingtonpost.com/politics/2021/08/26/cybersecurity-202-this-colorado-county-election-conspiracies-led-real-world-leak/>
289. Judge Seals Report on Voting Machine Vulnerability, Jose Pagliery and Shannon Vavra, *Daily Beast*, 13 August 2021. <https://www.thedailybeast.com/judge-seals-report-on-voting-machine-vulnerability>
288. Officials say new voting audits offer trust and transparency in elections, Jordan Wilkie, *Carolina Public Press*, 9 August 2021. <https://carolinapublicpress.org/47584/officials-say-new-voting-audits-offer-trust-and-transparency-in-elections/>
287. Texas GOP lawmakers want 2020 election audit—but only in big counties that mostly went for Biden, Eva Ruth Moravec *Washington Post*, 22 July 2021, <https://www.washingtonpost.com/politics/2021/07/22/texas-gop-forensic-audit-toth-paxton/>
286. Activists sue federal agency over voting system guidelines, *Associated Press*, 19 July 2021. <https://apnews.com/article/business-technology-government-and-politics-voting-cb9169604edbaf166db394328144c403>
285. Windham, NH, Election Status Report, *Right American Media*, 13 June 2021. <https://www.rightamericamedia.com/livechannel1?wix-vod-video-id=e0e2a65413ca4decb8b3fb713a9744cf&wix-vod-comp-id=comp-kfqel7ng>
284. Mystery Solved!: Professional Public Audit in NH Uncovers Why Hundreds of Votes Were Mistallied. Brad Friedman, *BradCast*, 8 June 2021, <https://bradblog.com/?p=13889>



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283. Trump hails 'patriots' behind 2020 election audit in New Hampshire town, Jeremy Beaman, *Washington Examiner*, 6 May 2021, <https://www.washingtonexaminer.com/news/trump-support-s-patriots-in-windham-audit>
282. What's Happening With Windham's Election Audit? Casey McDermott, *New Hampshire Public Radio*, 5 May 2021, <https://www.nhpr.org/post/whats-happening-windhams-election-audit>
281. Ashis Ray Speaks to Prof Philip B. Stark on "Evidence-based Elections," *National Herald* (India), 25 April 2021, [https://www.youtube.com/watch?v=Q\\_EX\\_f3PIpY&t=2s](https://www.youtube.com/watch?v=Q_EX_f3PIpY&t=2s)
280. Ralph Nader Radio Hour, Interview on Evidence-Based Elections, 10 April 2021, <https://ralphnaderradiohour.com/dont-mess-with-mesh-evidence-based-voting/>
279. OAN Report Features Baseless Assertion of Election Fraud by Algorithm, Angelo Fichera and Saranac Hale Spencer, *FactCheck.org*, 11 February 2021. <https://www.factcheck.org/2021/02/oan-report-features-baseless-assertion-of-election-fraud-by-algorithm/>
278. Election experts push back on ballot-marking device security concerns, Brooke Conrad, *Fox 11 News*, 4 January 2021. <https://fox11online.com/news/beyond-the-podium/election-experts-push-back-on-ballot-marking-device-security-concerns>
277. Georgia runoffs are impossible to properly audit, experts say, Brooke Conrad, *WWMT*, 17 December 2020. <https://wwmt.com/news/nation-world/georgia-runoffs-are-impossible-to-properly-audit-experts-say>
276. Two reasons the Texas election case is faulty: flawed legal theory and statistical fallacy, Jeremy W. Peters, David Montgomery, Linda Qiu, and Adam Liptak, *New York Times*, 10 December 2020. <https://www.nytimes.com/2020/12/10/technology/texas-election-lawsuit-legality.html>

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275. University Students on Lottery Hot Streak, CTV News Channel, 26 November 2020. <https://www.ctvnews.ca/video?clipId=2086543>
274. Ivy League graduates win over \$6M in 66 games, *Good Morning America*, 26 November 2020. <https://www.goodmorningamerica.com/news/video/ivy-league-graduates-win-6m-66-games-74415889>
273. Trump's Pants on Fire claim about votes exceeding voters in swing states, Jon Greenberg, *Politifact*, 23 November 2020. <https://www.politifact.com/factchecks/2020/nov/23/donald-trump/no-there-have-not-been-more-votes-people-who-voted/>
272. Georgia's Hand Count of 2020 ballots was No Risk-Limiting Audit, Steve Rosenfeld, *Moyers on Democracy*, 22 November 2020. <https://billmoyers.com/story/georgias-hand-count-of-2020-ballots-was-no-risk-limiting-audit/>
271. Why Georgia's Unscientific Recount 'Horrified' Experts, Timothy Pratt, *The Nation*, 20 November 2020. <https://www.thenation.com/article/politics/georgia-recount/>.
270. Is Trump right about Georgia vote? Robert Sanders, *Berkeley News*, 13 November 2020. <https://news.berkeley.edu/2020/11/13/is-trump-right-about-georgia-vote/>
269. Debunking the 'Hammer and Scorecard' election fraud conspiracy theory, *PolitiFact*, 10 November 2020. <https://www.politifact.com/factchecks/2020/nov/10/pamela-geller/debunking-hammer-and-scorecard-election-fraud-cons/>
268. Georgia to Use New Audit Tool to Assess Vote Count Accuracy—Is It Ready? Steven Rosenfeld, *Voting Booth*, 7 November 2020. <https://votingbooth.media/georgia-to-use-new-audit-tool-to-assess-vote-count-accuracy-is-it-ready/>
267. Do Hundreds of Counties Have 1.8 Million 'Ghost Voters' in the US? A study published by the activist legal group Judicial Watch used two different types of data to make a comparison. Bethania Palma, *Snopes*, 6 November 2020. <https://www.snopes.com/fact-check/ghost-voters-in-29-states/>

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266. Georgia to conduct its first 'risk limiting audit' before certifying election results, Ben Popkin, *NBC News*, 5 November 2020. <https://www.nbcnews.com/politics/2020-election/live-blog/2020-11-05-trump-biden-election-results-n1246510/ncrd1246677#blogHeader>
265. KCBS San Francisco Radio News, 1 November 2020. <https://omny.fm/shows/kcbsam-on-demand/election-day-is-coming-up-how-a-re-votes-audited>
264. How Safe Is the US Election from Hacking? Jennifer Cohn, *New York Review of Books*, 31 October 2020. <https://www.nybooks.com/daily/2020/10/31/how-safe-is-the-us-election-from-hacking/>
263. PBS News Hour, 29 October 2020. <https://www.pbs.org/newshour/show/how-some-election-officials-are-trying-to-verify-the-vote-more-easily>
262. Election security concerns remain as FBI probes Iran, Russia meddling, Douglas Kennedy, *Fox News*, 26 October 2020. <https://video.foxnews.com/v/6204789725001#sp=show-clips>
261. Rep. Calvert: Attorney General and Secretary of State are using their power to intimidate GOP voters, Juliette Fairley, *Southern California Record*, 19 October 2020. <https://socalrecord.com/stories/558066308-rep-calvert-attorney-general-and-secretary-of-state-are-using-their-power-to-intimidate-gop-voters>
260. Are the machines that count our mail-in ballots safe? Matthew Rozsa, *Salon*, 16 October 2020. <https://www.salon.com/2020/10/16/are-the-machines-that-count-our-mail-in-ballots-safe/>
259. Technology central to vote count in a tight election, Shaun Sutner, *TechTarget*, 30 September 2020. <https://searchbusinessanalytics.techtarget.com/news/252489904/Technology-central-to-vote-count-in-a-tight-election>
258. Election security researchers agree—online voting isn't ready for 'prime time,' Betsy Foresman, *Ed Scoop*, 21 September 2020. <https://edscoop.com/online-voting-not-ready-yet-election-security-research/>

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257. Craigslist founder funds new vote-by-mail study, university dean fears political weaponization, Juliette Fairley, *Southern California Record*, 16 September 2020. <https://socalrecord.com/stories/555100372-craigslist-founder-funds-new-vote-by-mail-study-university-dean-fears-political-weaponization>
256. Can I eat weeds in toxic soil? Yogahealer Podcast with Cate Stillman, September 2020. <https://yogahealer.com/can-i-eat-weeds-in-toxic-soil-with-dr-philip-stark-guest-dr-philip-stark/>
255. Civil Grand Jury Releases Scathing Report on LA County Voting Machines, David Goldstein, *CBS Los Angeles*, 22 June 2020. <https://losangeles.cbslocal.com/video/4599621-civil-grand-jury-releases-scathing-report-on-la-county-voting-machines/>
254. Lafayette Lens: Vote your Voice, Hannah Spitzer, WLTV, 21 May 2020. <https://video.wlvt.org/video/lafayette-lens-gsdmf6/>
253. Experts say COVID-19 presents threats to democratic process in general election, Rachel Barber, *The Daily Cal*, 10 May 2020. <https://www.dailycal.org/2020/05/10/covid-19-presents-threats-to-democratic-process-in-general-election/>
252. Eating our campus: Foraging in the face of the coronavirus, Hannah Frances Johansson, *The Daily Cal*, 27 March 2020. <https://www.dailycal.org/2020/03/27/eating-our-campus-foraging-in-the-face-of-the-coronavirus/>
251. Los Angeles County's risky voting experiment, Kim Zetter, *Politico*, 3 March 2020. <https://www.politico.com/news/2020/03/03/los-angeles-county-voting-experiment-119157>
250. Will L.A.'s Voting Overhaul be an Industry Disrupter or the Next Election Debacle?, Tierney Sneed, *Talking Points Memo*, 21 February 2020. <https://talkingpointsmemo.com/news/will-l-a-s-voting-overhaul-be-an-industry-disrupter-or-the-next-election-debacle>
249. 'Perfect storm': Los Angeles County's new voting system is approved for primary despite flaws Rosalina Nieves, *CNN*, 15 February

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2020. <https://www.cnn.com/2020/02/14/politics/la-county-new-voting-system-primary/index.html>
248. Goldstein Investigation: Officials Warn Of ‘Vulnerabilities’ With E-Voting Machines Ahead Of March 3 Primary *CBS Los Angeles*, 4 February 2020. <https://losangeles.cbslocal.com/2020/02/04/goldstein-investigation-officials-warn-of-vulnerabilities-with-e-voting-machines-ahead-of-march-3-primary/>
247. Foraged SuperFoods: Professor Philip B. Stark on the Nutritional Power of Weeds, *OnBlend*, 2 February 2020. <https://onblend.tealeaves.com/foraged-superfoods/>
246. LA’s New Voting System Is Still Uncertified. Why Election Security Experts Are Worried, Libby Denkmann, *LAist*, 16 January 2020. <https://laist.com/2020/01/16/los-angeles-county-voting-system-uncertified.php>
245. Reevaluating teacher evaluations in higher education: Relying on students to rate professors is convenient, cheap, and problematic. Toni Feder, *Physics Today*, 73, 1, 24, 1 January 2020 <https://doi.org/10.1063/PT.3.4386>
244. As Georgia rolls out new voting machines for 2020, worries about election security persist, Neena Satija, Amy Gardner, and Joseph Marks, *The Washington Post*, 23 December 2019. [https://www.washingtonpost.com/politics/as-georgia-rolls-out-new-voting-machines-for-2020-worries-about-election-security-persist/2019/12/23/c5036d74-2017-11ea-bed5-880264cc91a9\\_story.html](https://www.washingtonpost.com/politics/as-georgia-rolls-out-new-voting-machines-for-2020-worries-about-election-security-persist/2019/12/23/c5036d74-2017-11ea-bed5-880264cc91a9_story.html)
243. Two experts quit accountability group over claims it has been endorsing untrustworthy machines, Mark Sullivan, *Fast Company*, 13 December 2019. <https://www.fastcompany.com/90441559/two-experts-quit-election-accountability-group-over-claims-it-has-been-endorsing-untrustworthy-machines>
242. *The Brad Blog*, 13 December 2019. <https://bradblog.com/?p=13235>
241. Why this expert warns that a voting watchdog has ‘lost its way’ — and our elections are at risk. Steven Rosenfeld, *AlterNet*, 4 December

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240. Inventor of risk-limiting audits resigns from Verified Voting board, Eric Geller, *Politico*, 22 November 2019.
239. Expensive, Glitchy Voting Machines Expose 2020 Hacking Risks, Kartikay Mehrotra and Margaret Newkirk, *Bloomberg*, 8 November 2019. <https://www.bloomberg.com/news/articles/2019-11-08/expensive-glitchy-voting-machines-expose-2020-hacking-risks>
238. Why over 130,000 new voting machines could lead to more distrust in U.S. elections, Steven Rosenfeld, *Salon*, 8 October 2019. [https://www.salon.com/2019/10/08/why-over-130000-new-voting-machines-could-lead-to-more-distrust-in-u-s-elections\\_partner/](https://www.salon.com/2019/10/08/why-over-130000-new-voting-machines-could-lead-to-more-distrust-in-u-s-elections_partner/)
237. Speaking Out Against Student Evals, Colleen Flaherty, *Inside Higher Ed*, 10 September 2019. <https://www.insidehighered.com/news/2019/09/10/sociologists-and-more-dozen-other-professional-groups-speak-out-against-student>
236. Probe of missing Georgia votes finds “extreme” irregularities in black districts, Igor Derysh, *Salon.com*, 30 August 2019. <https://www.salon.com/2019/08/30/probe-of-missing-georgia-votes-finds-extreme-irregularities-in-black-districts-and/>
235. Wild: A State of Mind, *The Botanist*, August 2019. <https://www.thebotanist.com/wild-a-state-of-mind/mini-film-series/philipp-stark-usa/>
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233. Computer Scientists Make the Case Against an Expensive New Voting System Georgia is preparing to spend \$150 million on election technology. Experts worry it will be a security nightmare. Timothy Pratt, *The Atlantic*, 20 July 2019. <https://www.theatlantic.com/t>

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39. Dozens of personal care products mislabeled as ‘organic,’ lawsuit says. Joanna Lin, *California Watch*, 20 June 2011. <http://californiawatch.org/dailyreport/dozens-personal-care-products-mislabeled-organic-lawsuit-says-10873>
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35. Experts shouldn’t be needed to call outcome of election. *Albany Times Sun Union*, 1 January 2011. (Election auditing) <http://www.timesunion.com/opinion/article/Experts-shouldn-t-be-needed-to-call-outcome-of-930928.php>
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33. Fifty million to one: Mother defies odds to give birth on 10.10.10 after two others were born on 09.09.09 and 08.08.08. *Daily Mail*, 15 October 2010. (numerical coincidences) <http://www.dailymail.co.uk/news/article-1320840/Fifty-million-Mother-defies-odds-birth-10-10-10-born-09-09-09-08-08-08.html?ito=feeds-newsxml>

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32. Mom's babies born on 8-8-08, 9-9-09, 10-10-10. Elizabeth Weise, *USA TODAY*, 14 October 2010. (numerical coincidences) [http://www.usatoday.com/yourlife/parenting-family/babies/2010-10-14-Birthday14\\_ST\\_N.htm](http://www.usatoday.com/yourlife/parenting-family/babies/2010-10-14-Birthday14_ST_N.htm)
31. UC Berkeley Professor's Auditing System Aims to Count Votes More Accurately. Claire Perlman, *Daily Californian*, 28 April 2010. (Election auditing) [http://www.dailycal.org/article/109295/uc\\_berkeley\\_professor\\_s\\_auditing\\_system\\_aims\\_to\\_co](http://www.dailycal.org/article/109295/uc_berkeley_professor_s_auditing_system_aims_to_co)
30. California Assembly committee endorses UC Berkeley statistician's election auditing method. Robert Sanders, Media Relations, *UC Berkeley News*, 26 April 2010. (Election auditing) [http://www.berkeley.edu/news/media/releases/2010/04/26\\_canvass.shtml](http://www.berkeley.edu/news/media/releases/2010/04/26_canvass.shtml)
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28. Judge upholds November election of Novato Sanitary District board. Brent Ainsworth, *The Marin Independent Journal*, 8 March 2010. (Contested election) [http://www.marinij.com/marinnews/ci\\_14636416](http://www.marinij.com/marinnews/ci_14636416)
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26. Novato Sanitary board race tightens. Jim Welte, *The Marin Independent Journal*, 12 November 2009. (Contested election) [http://www.marinij.com/election/ci\\_13773039](http://www.marinij.com/election/ci_13773039)
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24. China To Require Filtering Software On PCs. Thomas Claburn, *Information Week*, 8 June 2009. (Internet content filtering) <http://www.informationweek.com/news/internet/policy/showArticle.jhtml?articleID=217800108&section=All+Stories>



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23. KQED-FM Forum program on the Census, 6 March 2009. (live appearance re census)
22. Census, partisan wrangling go hand-in-hand. Tyche Hendricks, *Scripps News*, 23 February 2009. (census) <http://www.scrippsnews.com/node/41139>
21. Why the census is always political. Tyche Hendricks, *San Francisco Chronicle*, 22 February 2009. (census) <http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2009/02/22/MNPB161PBV.DTL>
20. He's Out for the Count. Mark Hosenball, *NEWSWEEK*, 14 February 2009, Magazine issue dated 23 February 2009. (census) <http://www.newsweek.com/id/184802>
19. Measure B court challenge heads to San Francisco. Karen de Sá, *Mercury News*, 1 December 2008. (election integrity) [http://www.mercurynews.com/politics/ci\\_11113510](http://www.mercurynews.com/politics/ci_11113510)
18. New Election Audit Targets Close Races. Laura Snider, *Daily Camera*, 26 November 2008. (risk-limiting audits, election integrity) <http://www.dailycamera.com/news/2008/nov/26/new-election-audit-targets-close-races/>
17. Counting Continues for Elections Department. *Redwood Times*, 19 November 2008. (risk-limiting audits, election integrity) [http://www.redwoodtimes.com/local/ci\\_11023304](http://www.redwoodtimes.com/local/ci_11023304)
16. Checking It Twice. Julie J. Rehmeyer, *Science News*, 19 January 2008. (Election auditing) [http://www.sciencenews.org/view/generic/id/9292/title/Math\\_Trek\\_\\_Checking\\_It\\_Twice](http://www.sciencenews.org/view/generic/id/9292/title/Math_Trek__Checking_It_Twice)
15. *Reelz Channel Dailies* "Is it Real?" Reelz Channel, 15 June 2007. (gambling odds, probability)
14. Internet is 99 per cent porn free. Iain Thomson, *vnunet.com*, 15 November 2006. (Internet content filtering) <http://www.vnunet.com/vnunet/news/2168636/internet-per-cent-porn-free>
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content filtering) <http://www.informationweek.com/news/showArticle.jhtml?articleID=194300677&section=All+Stories>

12. 1 percent of Web sites deemed pornographic. Maryclaire Dale, *Associated Press*, 14 November 2006. (Internet content filtering) <http://www.msnbc.msn.com/id/15721799/>
11. Only 1 percent of Web pages have porn? Declan McCullagh, *News.com*, 14 November 2006. (Internet content filtering) [http://www.news.com/8301-10784\\_3-6135662-7.html](http://www.news.com/8301-10784_3-6135662-7.html)
10. U.S., Google Set to Face Off in Court. Michael Liedtke, *Associated Press*, 14 March 2006. (Internet content filtering) <http://www.sfgate.com/cgi-bin/article.cgi?file=/n/a/2006/03/13/financial/f133050S47.DTL&type=printable>
9. Google privacy issue enters court. *Al Jazeera*, 14 March 2006. (Internet content filtering) <http://english.aljazeera.net/archive/2006/03/2008410131655473737.html>
8. In Case About Google's Secrets, Yours Are Safe. Adam Liptak, *New York Times*, 26 January 2006. (Internet content filtering) <http://www.nytimes.com/2006/01/26/technology/in-case-about-googles-secrets-yours-are-safe.html>
7. Google Resists U.S. Subpoena of Search Data. Katie Hafner and Matt Richtel, *New York Times*, 20 January 2006. (Internet content filtering) <http://www.nytimes.com/2006/01/20/technology/20google.html?pagewanted=1>
6. Feds take porn fight to Google. Declan McCullagh and Elinor Mills, *CNET News*, 19 January 2006. (Internet content filtering) <https://www.cnet.com/news/feds-take-porn-fight-to-google/>
5. *AFC NewSource* story on airline security [Airings: The Osgood File (CBS Radio Network), 29 July 2003, 18 February 2003; KRON-TV (San Francisco), 3 February 2003]. (statistical auditing, security) [http://www.acfnewsresource.org/science/random\\_security.html](http://www.acfnewsresource.org/science/random_security.html)

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4. *The Fred Ebert Show* program on probability and statistics. KIRO 710, Seattle, WA, 27 October 2003. (live appearance re the Monty Hall problem, Statistics, Probability)
3. *ABC 7 News* story on census adjustment, 30 November 1998. (recorded appearance re census)
2. KQED-FM Forum program on the 2000 Census, San Francisco, CA, 17 July 1998. (live appearance re census) <http://www.kqed.org/radio/programs/forum/>
1. How deep is an earthquake? *Science News*, 2 March 1985. (Deep earthquakes)

## Teaching and Advising

### Courses

BerkeleyX 2.1x\* <https://www.edx.org/course/uc-berkeleyx/uc-berkeleyx-stat2-1x-introduction-594>, an Introductory Statistics MOOC (52,661 students enrolled in first offering; 15.5% completion rate. As of 21 October 2015, this was one of the 50 most popular MOOCs of all time)

BerkeleyX 2.2x\* <https://www.edx.org/course/uc-berkeleyx/uc-berkeleyx-stat2-2x-introduction-685>, an Introductory Statistics MOOC (20,871 students enrolled in first offering; 17% completion rate)

BerkeleyX 2.3x\* <https://www.edx.org/course/uc-berkeleyx/uc-berkeleyx-stat2-3x-introduction-825>, an Introductory Statistics MOOC (22,443 students enrolled in first offering; 12% completion rate)

Introduction to Statistics (Statistics 2)

Introduction to Probability and Statistics (Statistics 20)

Introductory Probability and Statistics for Business (Statistics 21, N21\*, W21\*)

Introduction to Probability and Statistics for Scientists and Engineers (Statistics 25)

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Societal Risks and the Law\* (Statistics C79)

Freshman Seminar on Statistics (Statistics 39)

Statistical Inferences for Social and Life Scientists (Statistics 131A)

Concepts of Probability (Statistics 134)

Concepts of Statistics (Statistics 135)

Linear Modeling: Theory and Applications (Statistics 151A)

Nonparametric Inference and Sensitivity Auditing with Applications to Social Good\* (Statistics 157)

Reproducible and Collaborative Statistical Data Science\* (Statistics 157, now 159/259). Video review: <http://youtu.be/Bq71Pqdukeo>

Probability and Statistics for Physical Science and Engineering PhD Students\*

Statistics for Engineering PhD students\*

Introduction to Probability and Statistics at an Advanced Level (Statistics 200A)

Theoretical Statistics (Statistics 210B)

Statistical Models: Theory and Applications (Statistics 215A, Statistics 215B)

Not enough Statistics for Journalists\* (Journalism 219)

Statistics Masters Program Capstone\* (Statistics 222)

Nonparametric and Robust Methods (Statistics 240)

Topics in Probability and Statistics (Statistics 260)

Statistical Consulting (Statistics 272)

\* Course I created or co-created.

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### **Former Graduate Students and Postdocs**

Imola K. Fodor, Roche

Johann Gagnon-Bartsch, University of Michigan

Christopher R. Genovese, Carnegie Mellon University

Niklaus W. Hengartner, Los Alamos National Laboratory

Janne Huttunen, University of Auckland and University of Kuopio

Bradley Luen, Indiana University

Tian Luo, U.S. Bureau of Labor Statistics

Dmitry I. Nikolayev, Schmidt Institute for Physics of the Earth

Kellie Ottoboni, Pinterest

R. Jay Pulliam, University of Texas at Austin

Karthik Ram, University of California, Berkeley

Jeffery Regier, University of Michigan

Chad M. Schafer, Carnegie Mellon University

Daniel Turek, University of California, Berkeley

Vincent S. Yates, Yammer

### **Graduate Committees**

1. Alameida, Jose, Mathematics. Ph.D. qualifying examination, 2008
2. Atz, Milos, Nuclear Engineering. Ph.D. qualifying examination, 2018
3. Bach, Andre, Physics. Ph.D. qualifying examination, 2011
4. Bar-Yossef, Ziv, Computer Science. Ph.D. qualifying examination, 2001; dissertation committee, "The Complexity of Massive Data Set Computations," 2002

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5. Bein, Ed, Biostatistics. MA examination, 2002
6. Berny, Axel Dominique, EECS. Ph.D. qualifying examination, 2004; dissertation committee, "Analysis and Design of Wideband LC VCOs," 2006
7. Bertelli, E., IEOR. Ph.D. qualifying examination, 2018
8. Bloniarz, Adam, Statistics. Ph.D. qualifying examination, 2014
9. Bodik, Peter, Computer Science. Ph.D. qualifying examination, 2007; dissertation committee, "Automating Datacenter Operations Using Machine Learning," 2010
10. Bowman, John Penfield, IEOR. Ph.D. qualifying examination, 2003
11. Bunn, Emory Freeman, Physics. Ph.D. qualifying examination, 1994; dissertation committee, "Statistical Analysis of Cosmic Microwave Background Anisotropy," 1995
12. Burleigh, Kaylan, Astronomy. Ph.D. qualifying examination, 2016, 2017; dissertation committee, "A Monte Carlo Method for Identifying Imaging Systematics in Galaxy Surveys," 2018
13. Burstein, Richard David II, Mathematics. Ph.D. qualifying examination, 2004; dissertation committee, "Hadamard Subfactors of Bisch-Haagerup Type," 2008
14. Buttrey, Samuel Edward, Statistics. Ph.D. qualifying examination, 1994; dissertation committee, "Nearest-Neighbor Classification with Categorical Variables," 1996
15. Calef, Brandoch Hugh, Applied Mathematics. Ph.D. qualifying examination, 1997; dissertation committee, "Optimal Sampling of the Discrete Fourier Transform," 2002
16. Charman, Andrew Emile, Physics. Ph.D. qualifying examination, 2003; dissertation committee, "Random Aspects of Beam Physics and Laser-Plasma Interactions," 2006

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17. Chen, Raymond Lei, EECS. Ph.D. qualifying examination, 1993; dissertation committee, "A Qualitative Modeling Framework of Semiconductor Manufacturing Processes: Self-Learning Fuzzy Inference System and the Statistical Analysis of Categorical Data," 1994
18. Chien, George, EECS. Ph.D. qualifying examination, 1998
19. Davis, William, Earth and Planetary Sciences. Ph.D. qualifying examination, 2019
20. Fernandez, Arturo, Statistics. Ph.D. qualifying examination, 2017
21. Feldman, Arnold R., EECS. Ph.D. qualifying examination, 1995; dissertation committee, "High-Speed, Low-Power Sigma-Delta Modulators for RF Baseband Channel Applications," 1997
22. Fodor, Imola K., Statistics. Ph.D. qualifying examination, 1997; chair, dissertation committee, "Spectrum Estimation in Helioseismology," 1999
23. Fong, Keng Leong, EECS. Ph.D. qualifying examination, 1996; dissertation committee, "Design and Optimization Techniques for Monolithic RF Downconversion Mixers," 1997
24. Gagnon-Bartsch, Johann, Statistics. Ph.D. qualifying examination, 2009; co-chair, dissertation committee "Removing Unwanted Variation from Microarray Data with Negative Controls," 2012
25. Gawiser, Eric Joseph, Physics. Ph.D. qualifying examination, 1998
26. Genovese, Christopher Ralph, Statistics. Ph.D. qualifying examination, 1992; chair, dissertation committee, "Statistical Problems in Helioseismology," 1994
27. Glazer, Amanda, Statistics. Ph.D. qualifying examination, 2021.
28. Goldman, Megan, Biostatistics. Chair, Ph.D. qualifying examination, 2009
29. Gung, Yuan-Cheng, Geophysics. Dissertation committee, "Q Tomography of the Earth Mantle," 2003

*P.B. Stark: CV*

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30. Hansen, Bendek, Statistics. Chair, MA thesis committee, “Minimax Expected Length Confidence Intervals,” 2000
31. Hansen, Mark Henry, Statistics. Chair, Ph.D. qualifying examination, 1992
32. Hengartner, Niklaus Walther, Statistics. Co-chair, dissertation committee, “Topics in Density Estimation,” 1993
33. Higgins, Mike, Statistics. Ph.D. qualifying examination, 2009, 2010
34. Huang, Hsiang-Ping, Mathematics. Ph.D. qualifying examination, 1996
35. Huang, Jianhua, Statistics. Ph.D. qualifying examination, 1994; dissertation committee, “Topics in Extended Linear Modeling,” 1997
36. Huang, Yuanlin, Civil Engineering. Ph.D. qualifying examination, 1993, 1994
37. Jiang, Xuesong, EECS. Ph.D. qualifying examination, 2001
38. Jones, David Morgan, Mathematics. Ph.D. qualifying examination, 1994; dissertation committee, “On Modular Galois Representations in Characteristic 3,” 1998
39. Katsis, Dimitrios, EECS. Ph.D. qualifying examination, 2005
40. Kiesling, Max Karl, Civil Engineering. Ph.D. qualifying examination, 1994
41. Kuusela, Mikael Johan, Statistics, École Polytechnique Fédérale de Lausanne, dissertation committee, “Uncertainty quantification in unfolding elementary particle spectra at the Large Hadron Collider,” 2016
42. Lara, Jose Daniel, Energy and Resources Group. Ph.D. qualifying examination, 2018
43. Li, Bo, Statistics. Ph.D. qualifying examination, 2004
44. Li, Wenyu, Mechanical Engineering. Ph.D. qualifying examination, 2017



*P.B. Stark: CV*

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45. Loscutoff, Peter, Physics. Ph.D. qualifying examination, 2011; dissertation committee, “Search for resonant  $WZ \rightarrow \ell\nu\ell\ell$  production using  $13fb^{21}$  in  $\sqrt{s} = 8TeV$   $pp$  collisions with the ATLAS detector,” 2013
46. Luen, Bradley, Statistics. Ph.D. qualifying examination, 2006; Chair, dissertation committee, “Earthquake Prediction: Simple Methods for Complex Phenomena,” 2010
47. Luo, Tian, Statistics. MA thesis chair, “Nonparametric estimation of business survival with an application to restaurant startups,” 2014
48. Madar, Vered, Statistics and Operations Research, Tel Aviv University. MA thesis committee, “Non-equivariant confidence intervals,” 2002; Ph.D. committee, “Simultaneous Confidence Intervals for Multiple Parameters with More Power to Determine the Sign,” 2007
49. Maurer, Tessa, Civil and Environmental Engineering. Ph.D. qualifying examination, 2018
50. Megnin, Charles Henri, Geophysics. Ph.D. qualifying examination, 1996; dissertation committee, “The Shear Velocity Structure of the Mantle from the Inversion of Time-Domain Waveform Data,” 1999
51. Mieler, Michael William, Civil Engineering. Ph.D. qualifying examination, 2011
52. Millman, Kenneth Jarrod, Biostatistics. MA thesis committee, “permute—a Python package for permutation tests and confidence sets,” 2015
53. Miratrix, Luke W., Statistics. Chair, Ph.D. qualifying examination, 2010
54. Mohanty, Sudatta, Civil Engineering. Ph.D. qualifying examination, 2017
55. Murmann, Boris, EECS. Ph.D. qualifying examination, 2002; dissertation committee, “Digital Calibration for Low-Power High-Performance A/D Conversion,” 2003

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56. Oreluk, James, Mechanical Engineering. Ph.D. qualifying examination, 2017; dissertation committee, “Role of Experimental Data in Validating and Quantifying Uncertainties in Complex Physical Systems,” 2019
57. Ottoboni, Kellie, Statistics. Ph.D. qualifying examination, 2017; chair, dissertation committee, “Classical Nonparametric Hypothesis Tests with Applications in Social Good,” 2019
58. Ou, Jeffrey Jiajiunn, EECS. Ph.D. qualifying examination, 1995
59. Petkov, Vladimir Plamenov, EECS. Ph.D. qualifying examination, 2003
60. Poobuapheun, Nuntachai, EECS. Ph.D. qualifying examination, 2005; dissertation committee, “LNA and Mixer Designs for Multi-Band Receiver Front-Ends,” 2009
61. Puente, Suzette, Statistics. M.A. committee, 2013
62. Pulliam, R. Jay, Geophysics. Ph.D. dissertation committee, “Imaging Earth’s Interior: Tomographic Inversion of Mantle P-Wave Velocity Structure,” 1991
63. Qian, Kun, EECS. Ph.D. qualifying examination, 2009; dissertation committee, “Variability Modeling and Statistical Parameter Extraction for CMOS Devices,” 2015
64. Regier, Jeffery, Statistics. Chair, M.A. committee, 2013; dissertation committee, “Topics in large-scale statistical inference,” 2016
65. Rein, Steven Richard, Statistics. Chair, Ph.D. qualifying examination, 1990
66. Rossi, Jim, Journalism. M.A. thesis committee, “Reverse-engineering the Echo Chamber,” 2017
67. Schafer, Chad Michael, Statistics. Ph.D. qualifying examination, 2001; chair, dissertation committee, “Constructing Confidence Regions of Optimal Expected Size: Theory and Application to Cosmic Microwave Inference,” 2004

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68. Son, Sang Won, EECS. Ph.D. qualifying examination, 2000; dissertation committee, “High Dynamic Range CMOS Mixer Design,” 2002
69. Spertus, Jacob, Statistics. Ph.D. qualifying examination, 2021.
70. Stern, Aaron James, Computational Biology. Ph.D. qualifying examination, 2017.
71. Su, Heng-Yi, Earth and Planetary Science. Ph.D. qualifying examination, 2021.
72. Suzuki, Toru, Demography. Ph.D. qualifying examination, 1995; dissertation committee, “Projection of Households in Japan with a Dynamic Macro-Simulation Model,” 1999
73. Tee, Luns, EECS. Ph.D. qualifying examination, 2001
74. Tenorio, Luis-Francisco, Mathematics. Ph.D. dissertation committee, “Asymptotic Dynamics of Locally Oblique Solitary Wave Solutions of the KP Equation,” 1992
75. Thompson, Neil, Statistics. M.A. committee, 2012
76. To, Albert Chi Fu, Statistics. M.A. committee, 2005
77. Wagner, Tim Allen, CS. Ph.D. qualifying examination, 1995; dissertation committee, “Practical Algorithms for Incremental Software Development Environments,” 1997
78. Waudby-Smith, Ian, Statistics, Carnegie Mellon University. Ph.D. qualifying examination, 2021.
79. Wang, Jason, Astronomy. Ph.D. qualifying examination, 2017; dissertation committee, “Footage of Other Worlds: Unveiling the Dynamical Architecture of Young Exoplanetary Systems,” 2018
80. Wicks, Charles Wesley Jr., Geophysics. Ph.D. qualifying examination, 1990; dissertation committee, “An Investigation of Mantle Discontinuities Beneath the Southwest Pacific,” 1994
81. Wilhelm, Matthieu, Université de Neuchâtel, Statistics. Ph.D. dissertation committee, “Random sampling with repulsion,” 2017

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82. Yao, Shijing, EECS. Ph.D. qualifying examination, 2015
83. Yates, Vincent, Statistics. Chair, M.A. committee, 2012
84. Ying, Jun, Naval Architecture. D. Eng. qualifying examination, 1995; dissertation committee, “Development and Verification of Computer Simulation Models for Evaluation of Siting Strategies and Evacuation Procedures for Mobile Drilling Units in Hurricanes,” 1996
85. Zhang, Xiaoyan, Statistics. Ph.D. qualifying examination, 1997
86. Zagheni, Emilio, Demography. Ph.D. qualifying examination, 2008
87. Zamora, Joel Barajas, UC Santa Cruz, EE. Ph.D. dissertation defense, 2015; dissertation committee, “Online Display Advertising Causal Attribution and Evaluation,” 2015

#### **First-year PhD advising**

2014–15 Thanh-Nhan (Andrew) Do

2014–15 Kellie Ottoboni

2016–17 Jake Soloff

2020-21 Emily Flanagan

#### **Current PhD advisees**

2018– Amanda Glazer

2018– Jacob Spertus

#### **Undergraduate Research and Honors Thesis Advisees**

2020 Sophie Chan (CalTech), Ran (Doris) Hsieh, Emily Hsiao, James Li, Hubert Luo, Teng Ma, William Ma, Francie McQuarrie, Jiazhong (Frank) Mei, Adalie Palma, Avi Sen, Stella Wan, Catherine Wang, Zihui Wang, Gracie Yao, Steven Ye, Wentao Zhan

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- 2019 Shivin Devgon, Emily Hsiao, James Li, Hubert Luo, Teng Ma, William Ma, Francie McQuarrie, Jiazhong (Frank) Mei, Adalie Palma, Avi Sen, Stella Wan, Catherine Wang, Zihui Wang, Gracie Yao, Steven Ye, Wentao Zhan
- 2018 Omar Buenrostro, Alan Chuang, Christopher Fan, Jin Kweon, James Li, Hubert Luo, William Ma, Jiazhong (Frank) Mei, Arun Ramamurthy, Avi Sen, Neil Sharma, Karen Tu, Yimeng Wang, Zihui (Lucy) Wang, Steven Ye, Saam Zahedian, Wentao Zhan
- 2015 Fang Cai, Catherine Darin (U. Pennsylvania)
- 2014 Hriday Kemburu, He Ma, Rachel Redberg
- 2010–2011 Katherine McLaughlin
- 2010 Aaron Taylor, Hua Yang
- 2009 Joshua M. Levin
- 2008 Jonathan Ong
- 2007 Gerold Ng
- 2003–2004 Feng Tang
- 1993–1996 Dendy Harjanto
- 1988–1993 10 others

## **Service**

### **Professional Societies and Government Agencies**

- 2022 – Board of Advisors, U.S. Election Assistance Commission; member, Special Committee on VVSG Lifecycle.
- Program committee, Seventh International Joint Conference on Electronic Voting (E-Vote-ID 2022)

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- Program committee, 1st International Workshop on Election Infrastructure Security (EIS 2022), held in conjunction with the 27th European Symposium on Research in Computer Security (ESORICS 2022)
  - Program committee, 2022 Workshop on Advances in Secure Electronic Voting Schemes (VOTING'22, held in conjunction with the 2022 Conference on Financial Cryptography and Data Security, FC'22)
  - Governance Committee, Association of Foragers
  - Editorial Board, *ScienceOpen*
  - Referee, *Conservation Biology*
- 2021
- Auditor, State of New Hampshire SB43 Forensic Election Audit <https://www.doj.nh.gov/sb43/index.htm>
  - Board of Advisors, , U.S. Election Assistance Commission; member, Special Committee on VVSG Lifecycle.
  - Risk-Limiting Audit Regulations Working Group, California Secretary of State
  - Program committee, 2022 Workshop on Advances in Secure Electronic Voting Schemes (VOTING'22, held in conjunction with the 2022 Conference on Financial Cryptography and Data Security, FC'22)
  - Governance Committee, Association of Foragers
  - Editorial Board, *ScienceOpen*
  - Chair for Auditability, IEEE/NIST Voting System Standards Committee (VSSC) Working Group For Voting Methods Mathematical Models (C/VSSC/1622.X.WG)
- 2020
- Board of Advisors, , U.S. Election Assistance Commission; member, Cybersecurity Subcommittee
  - Risk-Limiting Audit Regulations Working Group, California Secretary of State
  - Governance Committee, Association of Foragers
  - Editorial Board, *ScienceOpen*

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- Chair for Auditability, IEEE/NIST Voting System Standards Committee (VSSC) Working Group For Voting Methods Mathematical Models (C/VSSC/1622.X\_WG)
  - Program committee, 2021 Workshop on Advances in Secure Electronic Voting Schemes (VOTING’21, held in conjunction with the 2021 Conference on Financial Cryptography and Data Security, FC’21)
  - Program committee, 2020 Workshop on Advances in Secure Electronic Voting Schemes (VOTING’20, held in conjunction with the 2020 Conference on Financial Cryptography and Data Security, FC’20)
  - Program committee, Fifth International Joint Conference on Electronic Voting (E-Vote-ID 2020)
  - Referee, *Journal of the Academy of Business Education*
  - Consultant, U.S. Department of Justice, Civil Division
- 2019
- Board of Advisors, U.S. Election Assistance Commission
  - Risk-Limiting Audit Regulations Working Group, California Secretary of State
  - Editorial Board, *ScienceOpen*
  - Article editor, *Proceedings of the National Academy of Sciences*
  - Chair for Auditability, IEEE/NIST Voting System Standards Committee (VSSC) Working Group For Voting Methods Mathematical Models (C/VSSC/1622.X\_WG)
  - Program committee, 2019 Workshop on Advances in Secure Electronic Voting Schemes (VOTING’19, held in conjunction with the 2019 Conference on Financial Cryptography and Data Security, FC’19)
  - Program committee, Fourth International Joint Conference on Electronic Voting (E-Vote-ID 2019)
  - Referee, *Harvard Data Science Review*
  - Referee, *PeerJ*
  - Reviewer, Peder Sather Institute

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- Reviewer, Helmholtz Association of German Research Centres
- 2018 – Board of Advisors, , U.S. Election Assistance Commission
- Consultant, Colorado Secretary of State
- Reviewer, National Academies of Sciences, Engineering, and Medicine, Policy and Global Affairs Division
- Editorial Board, *ScienceOpen*
- Chair for Auditability, IEEE/NIST Voting System Standards Committee (VSSC) Working Group For Voting Methods Mathematical Models (C/VSSC/1622.X\_WG)
- Organizing Committee, Election Audit Summit, Caltech/MIT Voting Technology Project, December 2018. <https://electionlab.mit.edu/election-audit-summit>
- Program committee, 2018 Workshop on Advances in Secure Electronic Voting Schemes (VOTING'18, held in conjunction with the 2018 Conference on Financial Cryptography and Data Security, FC'18)
- Program committee, 2019 Workshop on Advances in Secure Electronic Voting Schemes (VOTING'19, held in conjunction with the 2019 Conference on Financial Cryptography and Data Security, FC'19)
- Program committee, Fourth International Joint Conference on Electronic Voting (E-Vote-ID 2019)
- Referee, *Geophysical Research Letters*
- Referee, *Proceedings of the National Academy of Sciences*
- Referee, *PeerJ*
- 2017 – Board of Advisors, , U.S. Election Assistance Commission
- Consultant, Colorado Secretary of State
- Founding Steering Committee and Editorial Board, USENIX Journal of Voting Technology
- Editorial Board, *ScienceOpen*
- Chair for Auditability, IEEE/NIST Voting System Standards Committee (VSSC) Working Group For Voting Methods Mathematical Models (C/VSSC/1622.X\_WG)



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- Program committee, 2018 Workshop on Advances in Secure Electronic Voting Schemes (VOTING’18, held in conjunction with the 2018 Conference on Financial Cryptography and Data Security, FC’18)
  - Program committee, 2017 Workshop on Advances in Secure Electronic Voting Schemes (VOTING’17, held in conjunction with the 2017 Conference on Financial Cryptography and Data Security, FC’17)
  - Chair, Mini-symposium on Open Data and Reproducibility, *2017 International Scientific Computing with Python (SciPy) Conference*, Austin, TX.
  - Referee, *Proceedings of the National Academy of Sciences*
- 2016
- Board of Advisors, U.S. Election Assistance Commission
  - Consultant, Colorado Secretary of State
  - Travis County Texas Elections Division STAR-Vote System Brain Trust
  - Founding Steering Committee and Editorial Board, USENIX Journal of Voting Technology
  - Associate editor, SIAM/ASA Journal of Uncertainty Quantification
  - Editorial Board, *ScienceOpen*
  - Chair for Auditability, IEEE/NIST Voting System Standards Committee (VSSC) Working Group For Voting Methods Mathematical Models (C/VSSC/1622.X\_WG)
  - Program committee, 2016 Workshop on Advances in Secure Electronic Voting Schemes (VOTING’16, held in conjunction with the 2016 Conference on Financial Cryptography and Data Security, FC’16)
  - Program committee, 2017 Workshop on Advances in Secure Electronic Voting Schemes (VOTING’17, held in conjunction with the 2017 Conference on Financial Cryptography and Data Security, FC’17)
  - Program committee, 12th International Joint Conference on Electronic Voting (E-Vote-ID 2016), Bregenz, Austria

*P.B. Stark: CV*

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- Session co-organizer, “Productive Ecologies in the Anthropocene: Foraging Systems,” Sixth International Conference on Food Studies, Berkeley, CA
- 2015
- Consultant, Colorado Secretary of State
  - Travis County Texas Elections Division STAR-Vote System Brain Trust
  - Founding Steering Committee and Editorial Board, USENIX Journal of Voting Technology
  - Associate editor, SIAM/ASA Journal of Uncertainty Quantification
  - Editorial Board, *ScienceOpen*
  - Chair for Auditability, IEEE/NIST Voting System Standards Committee (VSSC) Working Group For Voting Methods Mathematical Models (C/VSSC/1622.X.WG)
  - Program committee, VoteID 2015: The 5th International Conference on e-Voting and Identity, Bern, Switzerland. <http://www.voteid15.org/>
  - Program committee, 2015 European Symposium on Research in Computer Security (ESORICS 2015), Vienna, Austria. <http://esorics2015.sba-research.org/>
  - Program committee, 2016 Workshop on Advances in Secure Electronic Voting Schemes (VOTING’16, held in conjunction with the 2016 Conference on Financial Cryptography and Data Security, FC’16)
  - Session organizer, Teaching Computational Thinking and Practice, 2015 SIAM Conference on Computational Science and Engineering (CSE15)
  - Organizer, Berkeley Institute for Data Sciences and Moore/Sloan Data Science Environments 2015 Conference on Reproducibility
  - Referee, *PeerJ*
- 2014
- Consultant, Colorado Secretary of State
  - Travis County Texas Elections Division STAR-Vote System Brain Trust

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- Founding Steering Committee and Editorial Board, USENIX Journal of Election Technology and Systems (JETS)
  - Associate editor, SIAM/ASA Journal of Uncertainty Quantification
  - Editorial Board, *ScienceOpen*
  - Member, IEEE/NIST Voting System Standards Committee (VSSC) Working Group For Voting Methods Mathematical Models (C/VSSC/1622.X.WG)
  - Organizing committee co-chair, 2014 SIAM/ASA Conference on Uncertainty Quantification, Savannah, GA
  - Program committee, VoteID 2015: The 5th International Conference on e-Voting and Identity, Bern, Switzerland. <http://www.voteid15.org/>
  - Program committee, 2015 European Symposium on Research in Computer Security (ESORICS 2015), Vienna, Austria. <http://esorics2015.sba-research.org/>
  - Session organizer, late-breaking session on Reproducibility, 2014 Joint Statistical Meetings, Boston, MA
  - Session organizer and chair, 2014 Conference of the International Society for Nonparametric Statistics, Cadiz, Spain
  - Session organizer, Teaching Computational Thinking and Practice, 2015 SIAM Conference on Computational Science and Engineering (CSE15)
  - Referee, *PLoS One*
- 2013
- Consultant, California Secretary of State
  - Consultant, Colorado Secretary of State
  - Consultant, U.S. Department of Justice, Civil Division
  - Travis County Texas Elections Division STAR-Vote System Brain Trust
  - Founding Steering Committee and Editorial Board, USENIX Journal of Election Technology and Systems (JETS)
  - Associate editor, SIAM/ASA Journal of Uncertainty Quantification

*P.B. Stark: CV*

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- Organizing committee co-chair, 2014 SIAM/ASA Conference on Uncertainty Quantification, Savannah, GA
- Session organizer, Conference of the International Society for Non-parametric Statistics, Cadiz, Spain
- 2012
  - Consultant, California Secretary of State
  - Consultant, Colorado Secretary of State
  - Consultant, U.S. Department of Justice
  - Travis County Texas Elections Division STAR-Vote System Brain Trust
  - Founding Steering Committee, USENIX Journal of Election Technology and Systems (JETS)
  - Reviewer, National Science Foundation
  - Program committee, 2012 Electronic Voting Technology / Workshop on Transparent Elections (EVT/WOTE '12), USENIX Security Symposium, Bellevue, WA
  - Session organizer, 2012 Joint Statistical Meetings of the American Statistical Association, International Biometric Society, and Institute of Mathematical Statistics, San Diego, CA
  - Session organizer, 1st Conference of the International Society for NonParametric Statistics, Chalkidiki, Greece
  - Organizing committee co-chair, 2014 SIAM/ASA Conference on Uncertainty Quantification, Savannah, GA
  - Program committee, 2012 SIAM/ASA/SAMSI/USACM Conference on Uncertainty Quantification, Raleigh, NC
  - Session organizer, Election Verification Network (EVN) annual conference, Santa Fe, NM
- 2011
  - Consultant and Expert Witness, U.S. Department of Justice, Civil Division (for U.S. Department of Housing and Urban Development)
  - Program committee, 2012 SIAM/ASA/SAMSI/USACM Conference on Uncertainty Quantification, Raleigh, NC
  - Consultant, California Secretary of State

*P.B. Stark: CV*

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- Consultant, Colorado Secretary of State
- Session organizer, Election Verification Network (EVN) annual conference, Chicago, IL
- 2010
  - Consultant and Expert Witness, U.S. Department of Justice, Civil Division (for Department of Housing and Urban Development)
  - Consultant, State of Illinois
  - Consultant, California Attorney General (for California Highway Patrol)
  - Consultant, New York State Senate
  - Reviewer, Department of Defense Strategic Environmental Research and Development Program
  - Session organizer, Election Verification Network (EVN) annual conference, Washington, DC
- 2009
  - Consultant, California Secretary of State
- 2008
  - Consultant, California Secretary of State
- 2007
  - California Secretary of State Post-Election Audit Standards Working Group [http://www.sos.ca.gov/elections/elections\\_peas.htm](http://www.sos.ca.gov/elections/elections_peas.htm)
- 2006
  - Consultant and Expert Witness, U.S. Department of Justice, Civil Division
- 2005
  - Consultant, U.S. Department of Justice, Civil Division
  - Consultant, U.S. Department of Veterans Affairs Medical Center
  - Consultant, Habeas Corpus Resource Center
- 2004
  - Reviewer, National Science Foundation
  - Consultant, U.S. Department of Justice, Civil Division
  - Consultant, U.S. Attorney's Office
  - Consultant, U.S. Department of Veterans Affairs Medical Center
- 2003
  - Reviewer, National Science Foundation

*P.B. Stark: CV*

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- Referee, National Sciences and Engineering Research Council of Canada
- Consultant, U.S. Department of Veterans Affairs Medical Center
- 2002 – Consultant, U.S. Department of Agriculture
- Consultant, U.S. Department of Justice, Civil Division
- 2001 – Consultant, U.S. Department of Justice, Civil Division
- Co-organizer, Institute for Mathematics and Its Applications Annual Program *Mathematics in the Geosciences* and workshop on Inverse Problems and the Quantification of Uncertainty
- 2000 – Invited discussant, National Academy of Science Committee on National Statistics workshop on dual-system estimation for the 2000 Census
- Consultant, U.S. Department of Justice, Civil Division
- 1998 – Witness, U.S. House of Representatives Subcommittee on the Census.
- Panelist, National Science Foundation
- 1997 – Session organizer, International Statistical Institute and Bernoulli Society Meeting, Istanbul, Turkey
- 1996–present – Global Oscillation Network Group (GONG) Data Users Committee (Chair, 1996–1998)
- Reviewer for United States Geological Survey
- 1996–1999 – Consultant, National Security Agency
- 1995 – Institute of Mathematical Statistics Program Chair, Joint Statistical Meetings of the American Statistical Association, International Biometric Society, and Institute of Mathematical Statistics, Orlando, FL
- 1994–1996 – Consultant to Federal Trade Commission
- 1993 – Session organizer and chair, IMS/ASA/ENAR meeting, Philadelphia, PA

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- Session organizer and chair, Joint Statistical Meetings of the American Statistical Association, International Biometric Society, and Institute of Mathematical Statistics, San Francisco, CA
- 1992 – Faculty sponsor, Department of Energy TRAC program
- 1990–1994 – Bernoulli Society Committee on Statistics in the Physical Sciences
- 1991–present – Reviewer for National Aeronautics and Space Administration (Space Physics Division)
- 1991 – Local organizer and session chair, Mathematical Sciences Research Institute Workshop on Statistical Methods in Imaging, Berkeley, CA
- 1989 – Session organizer and chair, Bernoulli Society Satellite Meeting, Leuven, Belgium
- 1989–present – Reviewer for National Science Foundation (Atmospheric Sciences; Infrastructure; International Programs; Mathematical Sciences; Methodology, Measurement, and Statistics; Solar-Terrestrial Program; Statistics and Probability)

### **Foundations, Non-Profit Corporations, and Industry**

- 2022– – Board of Directors, Election Integrity Foundation
- 2020– – Strategic Board of Advisors, Open Source Election Technology (OSET) Institute
  - Board of Advisors, Herbicide-Free Campus
  - Governance Committee, Association of Foragers
- 2013–2019 – Board of Directors, Verified Voting Foundation
- 2011–2013 – Board of Advisors, Verified Voting Foundation
- 2010–2011 – Technical Advisory Board, Clear Ballot Group
- 2007 – Advisory Board, Facebar, Inc.
- 2000–2001 – Technical Advisory Board, Cogit.com

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- 2000–2002 – National Advisory Board, eTextbooksOnline.com
- Technical Advisory Board, Atomic Dog Publishing

### **Editorial and Referee Service**

#### *Editorial Service*

- 2014–present – Faculty Review Board, Berkeley Scientific Journal
- 2013–present – Editorial Board, ScienceOpen
- 2013–2016 – Associate Editor, SIAM/ASA Journal on Uncertainty Quantification
- 2012–2018 – Founding Steering Committee and Editorial Board, USENIX Journal of Election Technology and Systems (JETS)
- 2011–present – Editor, Frontiers in Statistics and Probability (Springer)
- 2008 – Guest Editor, Inverse Problems
- 1998–1999 – Editor, Statistical Science
- 1997–2000 – Editorial Board, Inverse Problems
- 1994–1998 – Associate Editor, Journal of Geophysical Research

#### *Referee Service*

1. American Association for the Advancement of Science
2. American Mathematical Monthly
3. Annales Geophysicae
4. Annals of the Institute of Statistical Mathematics
5. Annals of Statistics
6. Arabian Journal for Science and Engineering
7. Astrophysical Journal



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8. Bulletin of the Seismological Society of America
9. Cambridge University Press
10. Chapman-Hall
11. Computational Statistics and Data Analysis
12. Conservation Biology
13. Electronic Journal of Statistics
14. Foods
15. Geophysical Journal International
16. Geophysical Research Letters
17. Geophysics
18. Geophysical & Astrophysical Fluid Dynamics
19. HarperCollins
20. Harvard Data Science Review
21. IEEE Journal on Acoustics, Speech and Signal Processing
22. IEEE Journal on Information Theory
23. Inverse Problems
24. Inverse Problems and Imaging
25. Journal of the Academy of Business Education
26. Journal of the American Statistical Association
27. Journal of Computational Physics
28. Journal of Economic Literature
29. Journal of Geophysical Research
30. Jurimetrics

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31. Nature
32. Nature Climate Change
33. PeerJ
34. Political Analysis
35. Physics of the Earth and Planetary Interiors
36. PLoS One
37. Proceedings of the National Academy of Sciences
38. Science
39. SIAM Review
40. Simon and Schuster
41. Springer-Verlag
42. Statistics, Politics, and Policy
43. Statistical Science
44. Tectonophysics

### **University Service**

- 2021–2022
- Steering Committee, STEM Excellence through Equity & Diversity (SEED) Scholars Program
  - Executive Committee and Advisory Board, Peder Sather Center for Advanced Study
  - Advisory Board, Berkeley Institute for Data Science (BIDS)
  - Program Advisory Committee, Doctor of Business Administration Program, Lincoln University
  - Member, Berkeley Science Network <http://bsn.berkeley.edu>
- 2020–2021
- Associate Dean, Division of Mathematical and Physical Sciences

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- Interim Regional Associate Dean, College of Chemistry and Division of Mathematical and Physical Sciences (ChaMPS)
  - Steering Committee, STEM Excellence through Equity & Diversity (SEED) Scholars Program
  - Executive Committee and Advisory Board, Peder Sather Center for Advanced Study
  - Advisory Board, Berkeley Institute for Data Science (BIDS)
  - Scientific Advisory Board, European Union H2020 Project Moving Towards Adaptive Governance in Complexity: Informing Nexus Security (MAGIC), Universitat Autònoma de Barcelona (Spain) and University of Bergen (Norway)
  - Program Advisory Committee, Doctor of Business Administration Program, Lincoln University
  - Member, Berkeley Science Network <http://bsn.berkeley.edu>
- 2019–2020
- Associate Dean, Division of Mathematical and Physical Sciences
  - Interim Regional Associate Dean, College of Chemistry and Division of Mathematical and Physical Sciences (ChaMPS)
  - Steering Committee, STEM Excellence through Equity & Diversity (SEED) Scholars Program
  - Executive Committee and Advisory Board, Peder Sather Center for Advanced Study
  - UC Berkeley Signature Initiatives working group for Inclusive Intelligence
  - University of California Systemwide Task Force on Herbicides / Safer Chemicals
  - Advisory Board, Berkeley Institute for Data Science (BIDS)
  - Scientific Advisory Board, European Union H2020 Project Moving Towards Adaptive Governance in Complexity: Informing Nexus Security (MAGIC), Universitat Autònoma de Barcelona (Spain) and University of Bergen (Norway)
  - Program Advisory Committee, Doctor of Business Administration Program, Lincoln University

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- Member, Berkeley Science Network <http://bsn.berkeley.edu>
- 2018–2019
  - Associate Dean, Division of Mathematical and Physical Sciences
  - UC Berkeley Signature Initiatives working group for Inclusive Intelligence
  - Campus Experience Working Group, Undergraduate Student Diversity Project, UC Berkeley
  - University of California Systemwide Task Force on Herbicides / Safer Chemicals
  - Advisory Board, Berkeley Institute for Data Science (BIDS)
  - Scientific Advisory Board, European Union H2020 Project Moving Towards Adaptive Governance in Complexity: Informing Nexus Security (MAGIC), Universitat Autònoma de Barcelona (Spain) and University of Bergen (Norway)
  - Faculty Advisory Committee, Berkeley Resource Center for Online Education (BRCOE)
  - Faculty Athletic Fellow
  - Program Advisory Committee, Doctor of Business Administration Program, Lincoln University
  - Member, Berkeley Science Network <http://bsn.berkeley.edu>
  - Schmidt Science Fellows Program review committee
- 2017–2018
  - Associate Dean, Division of Mathematical and Physical Sciences
  - Chancellor’s Strategic Planning Committee on Enrollment Growth
  - Interdepartmental Committee on the Formation of the Division of Data Sciences
  - Director, Statistical Computing Facility
  - *Ad hoc* Data Sciences Divisional committee on undergraduate degree programs
  - Advisory Board, Berkeley Institute for Data Science (BIDS)
  - Academic Program Review Committee, Academic Senate representative, Department of Agricultural and Resource Economics

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- Scientific Advisory Board, European Union H2020 Project Moving Towards Adaptive Governance in Complexity: Informing Nexus Security (MAGIC), Universitat Autònoma de Barcelona (Spain) and University of Bergen (Norway)
  - Faculty Advisory Committee, Berkeley Resource Center for Online Education (BRCOE)
  - Faculty Advisory Committee, Athletic Study Center
  - Faculty Athletic Fellow
  - Program Advisory Committee, Doctor of Business Administration Program, Lincoln University
  - Member, Berkeley Science Network <http://bsn.berkeley.edu>
- 2016–2017
- Associate Dean, Division of Mathematical and Physical Sciences
  - Director, Statistical Computing Facility
  - Advisory Board, Berkeley Institute for Data Science (BIDS)
  - Scientific Advisory Board, European Union H2020 Project Moving Towards Adaptive Governance in Complexity: Informing Nexus Security (MAGIC), Universitat Autònoma de Barcelona (Spain) and University of Bergen (Norway)
  - Faculty Advisory Committee, Berkeley Resource Center for Online Education (BRCOE)
  - Faculty Advisory Committee, Athletic Study Center
  - Faculty Athletic Fellow
  - Program Advisory Committee, Doctor of Business Administration Program, Lincoln University
  - Member, Berkeley Science Network <http://bsn.berkeley.edu>
- 2015–2016
- Associate Dean, Division of Mathematical and Physical Sciences
  - Faculty Advisory Committee, Berkeley Resource Center for Online Education (BRCOE)
  - Faculty Advisory Committee, Athletic Study Center
  - Faculty Athletic Fellow

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- Program Advisory Committee, Doctor of Business Administration Program, Lincoln University
  - Member, Berkeley Science Network <http://bsn.berkeley.edu>
- 2014–2015
- Chair, Department of Statistics
  - Director, Statistical Computing Facility
  - Faculty Advisory Committee, Berkeley Resource Center for Online Education (BRCOE)
  - Campus Working Group on Course Curriculum and Design
  - Faculty Advisory Committee, Athletic Study Center
  - Engineering Science Advisory Committee, College of Engineering
  - Faculty Athletic Fellow
  - Program Advisory Committee, Doctor of Business Administration Program, Lincoln University
  - Member, Berkeley Science Network <http://bsn.berkeley.edu>
- 2013–2014
- Chair, Department of Statistics
  - Director, Statistical Computing Facility
  - Commission on the Future of the UC Berkeley Library <http://academic-senate.berkeley.edu/issues/commission-future-uc-berkeley-library>  
Charge: <http://evcp.berkeley.edu/sites/default/files/Library%20Commission%2009.21.2012.pdf>  
Final Report: <http://evcp.berkeley.edu/news/commission-future-uc-berkeley-library-report>
  - Faculty Advisory Committee, Berkeley Resource Center for Online Education (BRCOE)
  - Campus Working Group on Course Curriculum and Design
  - Faculty Advisory Committee, Athletic Study Center
  - Engineering Science Advisory Committee, College of Engineering
  - Search Committee, Director of IT for College of Letters and Sciences
  - Faculty Athletic Fellow

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- Program Advisory Committee, Doctor of Business Administration Program, Lincoln University
  - External Review Committee, Department of Applied Mathematics and Statistics, Colorado School of Mines
  - Member, Berkeley Science Network <http://bsn.berkeley.edu>
- 2012–2013
- Chair, Department of Statistics
  - Director, Statistical Computing Facility
  - Commission on the Future of the UC Berkeley Library
  - Faculty Advisory Committee, Berkeley Resource Center for Online Education (BRCOE)
  - Engineering Science Advisory Committee, College of Engineering
  - Faculty Athletic Fellow
  - Program Advisory Committee, Doctor of Business Administration Program, Lincoln University
  - Member, Berkeley Science Network <http://bsn.berkeley.edu>
- 2011–2012
- Acting Department Chair, Department of Statistics, July–August
  - Vice Chair, Department of Statistics
  - Academic Senate Alternate Representative to University of California Systemwide Assembly
  - Academic Senate Committee on Academic Planning and Resource Allocation (CAPRA)
  - Campus Committee on Classroom Policy and Management (CC-CPM)
  - Business Resumption Coordination Group (BRCG)
  - Faculty Athletic Fellow
  - Program Advisory Committee, Doctor of Business Administration Program, Lincoln University
- 2010–2011
- Academic Senate Committee on Academic Planning and Resource Allocation (CAPRA)
  - Campus Committee on Classroom Policy and Management (CC-CPM)

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- Course Note-Taking Taskforce (<http://campuspol.chance.berkeley.edu/policies/coursenotes.pdf>)
  - *Ad hoc* tenure/promotion committee
  - Faculty Athletic Fellow
  - Program Advisory Committee, Doctor of Business Administration Program, Lincoln University
- 2009–2010
- Academic Senate Committee on Computing and Communications (COMP)
  - Faculty Athletic Fellow
- 2008–2009
- Faculty Athletic Fellow
- 2007–2008
- Undergraduate Student Learning Initiative Faculty Advisory Committee
  - Faculty Athletic Fellow
- 2006–2007
- Faculty Athletic Fellow
- 2005–2006
- Faculty Athletic Fellow
- 2004–2005
- Chair, Educational Technology Committee
  - e-Berkeley Steering Committee
  - e-Berkeley Committee of Chairs
  - e-Berkeley Implementation Task Force
  - CourseWeb Steering Committee
  - Faculty Athletic Fellow
- 2003–2004
- Chair, Educational Technology Committee
  - e-Berkeley Steering Committee
  - e-Berkeley Implementation Task Force
  - Student Systems Policy Committee
  - CourseWeb Steering Committee
- 2002–2003
- Faculty Assistant in Educational Technology (to Vice Provost for Undergraduate Education)



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- Chair, Educational Technology Committee
  - Provost’s Academic Council
  - e-Berkeley Steering Committee
  - e-Berkeley Implementation Task Force
  - Campus Committee on Classroom Policy and Management (CC-CPM)
  - Student Systems Policy Committee
  - e-Berkeley Symposium Program Committee
  - Faculty Search Committee, Graduate School of Education
  - CourseWeb Steering Committee
- 2001–2002
- Faculty Assistant in Educational Technology (to Vice Provost for Undergraduate Education)
  - Chair, Educational Technology Committee
  - Provost’s Academic Council
  - e-Berkeley Steering Committee
  - e-Berkeley Implementation Task Force
  - Campus Committee on Classroom Policy and Management (CC-CPM)
  - Academic Senate Committee on Academic Planning and Resource Allocation (CAPRA)
  - CITRIS II Program Committee
  - TeleBEARS and BearFacts Committees (combined into Student Systems Policy Committee as of 3/2002)
  - e-Berkeley Portal Working Group
  - Faculty search committee, Graduate School of Education
- 2000–2001
- Space Allocation and Capital Improvements (SACI)
  - Academic Senate Committee on Academic Planning and Resource Allocation (CAPRA)
  - CAPRA Subcommittee on Expanded Enrollment
  - CAPRA Subcommittee on changes to Academic Coordinator title

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- *Ad hoc* hiring/tenure committee
- 1999–2000
  - Space Allocation and Capital Improvements (SACI)
  - Academic Senate Library Committee (LIBR)
  - Academic Senate Committee on Academic Planning and Resource Allocation (CAPRA), Physical Planning Subcommittee, *ex officio* representative from Library Committee
  - Academic Effects Study Committee, Molecular Engineering Building
  - *Ad hoc* tenure/promotion committee
  - SACI subcommittee to audit space in Barrows Hall
- 1998–1999
  - Space Allocation and Capital Improvements (SACI)
  - Electronic Dissertations Project
  - Planning Space for the Physical Sciences Libraries
- 1997–1998
  - *Ad hoc* tenure/promotion committee
- 1996
  - Review of College of Science, King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia
- 1994–1999
  - University review committee for Department of Agricultural and Resource Economics, University of California, Berkeley
- 1993–1995
  - Physical Sciences Division committee for Graduate Affirmative Action and Retention
  - Physical Sciences Division committee for Science and Mathematics Academic Re-Training (SMART)

## Contracts and Grants

1. PI, NASA Grant NAG 5-883, “Constructing Core Fields Consistent with Geomagnetic Data and Geophysical Constraints,” 1987–1990.
2. Project Director and PI, NSF Grant DMS-8810192, “Inference in Curved-Ray Tomography: Solid Earth Structure,” 1989–1992.

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3. PI, NSF Grant INT-9205103, “Long and Medium-Term Research: Inference in Seismological Investigations of Subducting Lithosphere,” 1992–1994.
4. PI, NSF Grant DMS-930006P, “Estimating the Sun’s Internal Angular Velocity from Free-Oscillation Frequency Splittings,” 1993–1994.
5. PI, NSF Presidential Young Investigator Award DMS-8957573, 1989–1995.
6. Co-I, NASA Grant NAG5-2438, “The Analysis of Cobe DMR Sky Maps,” 1993–1994. PI: J. Silk
7. PI, NASA Grant NAGW-2515, “New Methods for Inversion and Analysis of Solar Free-Oscillation Data,” 1991–1995.
8. PI, NSF Grant DMS-9404276, “New Methods for Inference From COBE Data,” 1994–1997.
9. PI, NSF Grant AST-9504410, “Function Estimation and Inference in Helioseismology,” 1995–1998.
10. PI, LLNL/IGPP Grant 97-AP028, “Helioseismology with Solar Luminosity Constraints,” 1996–1997.
11. Co-I, NASA Grant NAG5-3941, “Development of data analysis, compression and visualization tools for large data sets in astrophysics and cosmology,” 1997–1998. PI: J. Silk
12. PI, NASA Grant NRA-96-09-OSS-034SOHO, “Modern Statistical Methods for Helioseismic Spectrum Estimation,” 1997–1998.
13. PI, NASA Grant NAG 5-3919, “Data Sampling Rate Reduction for the Oersted Satellite,” 1997–1998.
14. PI, UC Berkeley Classroom Technologies Grant, “Statistics *Statim*,” 1997–1998.
15. Co-I, NSF Grant DMS-9872979, “*KDI: Computational Challenges in Cosmology*,” 1998–2000. PI: A. Jaffe.

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16. Co-I, NSF Grant IIS-98-17353, “*Re-Inventing Scholarly Information Dissemination and Use*,” 4/1/1999–3/31/2004. PI: R. Wilensky and D. Forsythe.
17. PI, Hewlett Packard Company Grant 89293, “Applied Mobile Technology Solutions in Learning Environments,” 3/19/2003–8/31/2004. Status report:  
<https://www.stat.berkeley.edu/~stark/Grants/hp89293.htm>
18. PI, Hewlett Packard Company Grant 14928, “Applied Mobile Technology Solutions in Learning Environments—2004 Extension Grant,” 4/1/2004–6/30/2005.
19. PI, LLNL Grant B565605, “Uncertainty in Complex Simulations,” 4/3/2007–9/30/2007.
20. PI, LLNL Grant B585264, “Uncertainty Quantification with Applications to Climate Modeling,” 11/3/2009–9/30/2010.
21. PI, Genentech Inc. Grant 008485, “Measuring Glucose with NIR,” 2/24/2010–10/31/2010.
22. Co-I, NSF Grant DUE-1060487, “S-STEM Berkeley Science Network Scholarship Program,” 3/1/2011–2/28/2015. PI: M. Richards.
23. PI, State of Colorado U.S. Election Assistance Commission subaward UC01, 2010 Pre-Election Logic and Accuracy Testing and Post-Election Audit Initiative, 5/23/2011–4/23/2013.
24. PI, State of California Election Assistance Commission subaward 10I10066, Post Election Risk-Limiting Audit Pilot Program, 9/13/2011–4/23/2013.
25. PI, Bill and Melinda Gates Foundation Grant OPP1077697, “An Introductory Statistics MOOC With Field-Tested Online Assessments,” 12/20/2012–7/31/2013.
26. Co-I, UC Berkeley MOOCLab Grant, “Forum Usage in Statistics MOOCs: Disentangling Correlation from Causation,” 10/2013–8/2014. PI: M. Hearst.

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27. Co-I, Berkeley Institute for Data Science, grant from the Gordon and Betty Moore Foundation and the Sloan Foundation. 12/2013–12/2018. PI: S. Perlmutter.
28. PI, UC Berkeley Food Institute Grant, “Reaping without Sowing: Urban Foraging, Sustainability, Nutrition, and Social Welfare,” 2/2014–8/2015.
29. Co-I, NSF, DGE–1450053, “NRT-DESE Data Science for the 21st Century (DS421),” 2015–2020. PI: D. Ackerley.
30. PI, UC Berkeley Food Institute Grant, “Wild Food: Investigating and Reducing Barriers to the Consumption of Foraged Foods,” 5/2015–12/2015.
31. PI, State Street Bank and Trust Company Grant, “Industry Partners Program: Consortium for Data Analytics in Risk (CDAR); and Berkeley Institute for Data Science (BIDS) at UC Berkeley,” 2/2015–6/2018.
32. PI, Dascena subaward from NIH, “SBIR: A Computational Approach to Early Sepsis Detection,” 4/2017–6/2017.
33. PI, Peder Sather Grant, “Mainstreaming Sensitivity Analysis and Uncertainty Auditing,” 7/2017–6/2018.
34. Co-I, NSF Grant DMS–1745640, “(RTG): Advancing Machine Learning–Causality and Interpretability,” 2018–2023.
35. Co-I, NSF Grant SES–1757307, “Multidisciplinary Conference on Election Auditing: Cambridge, Massachusetts,” 2018–2020.

## **Consulting and Expert Witness Experience**

Association of University of New Brunswick Teachers, Fredericton, New Brunswick, Canada: teaching evaluations and academic employment discrimination

Baker & McKenzie LLP, New York, NY: sampling and uncertainty quantification (client Nuclear Electric Insurance Limited, NEIL)

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Austin Community College, Austin, TX: teaching evaluations

Bartlit Beck Herman Palenchar & Scott LLP, Denver, CO: intellectual property litigation (client Tessera)

Bingham McCutchen LLP, Los Angeles, CA: sampling in litigation

Boies Schiller Flexner LLP, San Francisco, CA: sampling and inference in litigation (client Apple Inc.)

Bramson, Plutzik, Mahler & Birkhaeuser LLP, Walnut Creek, CA: consumer class action litigation

Bruce P. Brown Law, Atlanta, GA: election integrity litigation (client Donna Curling et al.)

Brinks, Hofer, Gilson & Lione, Chicago, IL: intellectual property litigation (clients R.J. Reynolds, Actavis)

Calfee, Halter & Griswold LLP, Cleveland, OH: tort litigation (client FirstEnergy Corp)

California-American Water Company: utilities regulation, census and survey data

Capital One: economic modeling and credit risk management; intellectual property litigation; credit loss forecasting

Carey and Carey, Palo Alto, CA: equal protection, civil litigation

CIBC: economic modeling and credit risk management

Cisco Systems: predicting email spool fill

City of Santa Rosa, CA: water treatment monitoring

Coalition for Good Governance, Boulder, CO: election integrity

Cogit.com, San Francisco, CA: Technical advisory board; data mining, targeted web advertising

Constantine, Cannon, San Francisco, CA, and New York, NY: *Qui Tam* litigation (three cases)

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Contra Costa County Public Defender, Richmond, CA: equal protection, due process, medical treatment for defendants found incompetent to stand trial

Council of Europe, Venice Commission, Venice, Italy: election integrity, electoral fraud

Crosby, Heafey, Roach, & May, Oakland, CA: insurance litigation (client Farmer's Insurance)

Croskery Law Offices, Cincinnati, OH: employment discrimination litigation

DLA Piper, Atlanta, GA, and Washington, DC: sampling in litigation.

East Bay Municipal Utilities District, Oakland, CA: water treatment monitoring

EEG Systems Laboratory, San Francisco, CA: inverse problems for electrical activity of the brain

Emery Celli Brinckerhoff & Abady LLP, Washington, DC: election recounts (client Jill Stein)

eTextbooksOnline.com, New York, NY: National Advisory board

Farella Braun + Martel LLP, San Francisco, CA: sampling and estimation in litigation

Federal Trade Commission, San Francisco, CA: sampling in litigation

Florida Education Association, Tallahassee, FL: teaching evaluations in academic employment decisions

Folger, Levin & Kahn, LLP, San Francisco, CA: sampling and risk management in litigation (client California Self-Insurers' Security Fund)

Fried, Frank, Harris, Shriver & Jacobsen LLP, New York, NY: sampling and estimation in securities litigation (clients Citigroup Global Markets Inc.; Goldman, Sachs & Co.; UBS Securities LLC)

Fuller-Austin Joint Defense Group: modeling in litigation

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Georgia Department of Law, Atlanta, GA: lottery winnings (client Georgia Lottery Corporation)

Gibson, Dunn & Crutcher, New York, NY: sampling and estimation in litigation (client AIG / Lavastone Capital)

GMAC Financial Services: economic modeling and credit risk management

Habeas Corpus Resource Center, San Francisco, CA: bias in jury selection

Howard, Rice, Nemerovski, Canady, Falk, & Rabkin, San Francisco, CA: sampling in litigation; inference from retail sales data (clients K-Mart Corp., R.J. Reynolds)

Howrey LLP, East Palo Alto, CA: sampling in litigation (client Apple Inc.)

HSBC: economic modeling and credit risk management

Jones Day, Columbus, OH: sampling and estimation in litigation (client Cardinal Health)

Kaiser Permanente Northern California, Redwood City, CA: clinical trials in oncology

Kelley Jasons McGuire & Spinelli, LLP: insurance litigation (client St. Paul Fire & Marine Insurance Company)

Keller Grover LLP, San Francisco, CA: *Qui Tam* litigation

Kemnitzer, Barron & Krieg, LLP, San Francisco, CA: sampling in consumer class action litigation

Kipling Law Group, Seattle, WA: sampling in litigation (client AT&T Wireless)

KLA Instruments Corporation, San Jose, CA: calibration of algorithms to detect IC mask flaws

Kramer, Levin, Naftalis, & Frankel, New York, NY: sampling in litigation



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Latham & Watkins, LLP, Menlo Park, CA, and San Francisco, CA: sampling in consumer class action litigation (clients Apple Inc., Silver Spring Networks)

Law Offices of Gorman & Miller, San Jose, CA: trade secret litigation

Law Offices of Ison W. New, San Francisco, CA: natural resource legislation (client California Abalone Association)

Law Offices of Ramirez, Tollner, Stebbins, Bahrack, & Sasseen, San Jose, CA: trade secret litigation

Law Offices of Welebir & McCune, Woodside, CA: product liability litigation

Law Offices of Wells, Pinckney & McHugh, Austin, TX: employment discrimination arbitration

Law Offices of Wolkin & Timpane, San Francisco, CA: insurance litigation (client CIGNA)

Law Offices of Scott K. Zimmerman, Brentwood, CA: product liability litigation

Life Chiropractic College West, Hayward, CA: experimental design

Littler Mendelson, P.C., Dallas, TX, Los Angeles, CA, and San Francisco, CA: sampling in employment wage and hour class action litigation

Los Angeles Superior Court, Central District: sampling in employment wage and hour litigation

Manatt, Phelps & Phillips LLP, San Francisco, CA: utilities regulation (client California-American Water Company)

Mayer, Brown, Rowe & Maw, Chicago, IL: intellectual property litigation (client Capital One)

Mayer Brown LLP, New York, NY: mortgage-backed securities litigation (clients Bank of New York Mellon, Citibank N.A.)

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Memorial University Faculty Association (MUNFA), St. Johns, NL, Canada: teaching evaluations in academic employment decisions

Meyers Nave, Oakland, CA: election dispute litigation (client Novato Sanitary District)

Monaghan Safar Ducham PLLC, Burlington, VT: employment discrimination

Morgan, Lewis & Bockius LLP, Los Angeles, CA: sampling in litigation

Morrison & Foerster, San Francisco, CA: product liability class action litigation, causal inference in litigation (clients American Cemwood, Iovate Health Sciences)

Munger, Tolles & Olson, LLP, San Francisco, CA and Los Angeles, CA: consumer class action litigation, intellectual property litigation, sampling (clients Verizon Wireless, Philip Morris, Tessera)

Murphy & McGonigle, Washington, DC: risk management and credit loss forecasting (client Capital One)

National Security Agency: adaptive filtering, combining expert opinions, digital communications, information retrieval, estimation

National Solar Observatory, Tucson, AZ: spectrum estimation

Albert A. Natoli, P.C., New York, NY: surveys in consumer class action litigation

New Hampshire Department of Justice, New Hampshire Secretary of State, and Town of Windham, New Hampshire: election auditing

Nichols Kaster PLLP, Minneapolis, MN: sampling and damage estimation in consumer class action litigation

Norton Rose Fulbright US LLP, Houston, TX: construction defect litigation (client M.J. Dean Construction, Inc.)

Nossaman LLP, San Francisco, CA: utilities regulation (client California-American Water Company)

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Office of the Attorney General, State of California, Oakland, CA: sampling in litigation (client California Highway Patrol)

Ontario Confederation of University Faculty Associations (OCUFA) and Ryerson Faculty Association, Toronto, ON: teaching evaluations in academic employment decisions

Oracle: sampling and risk analysis

Orrick, Herrington & Sutcliffe LLP, Los Angeles and Sacramento, CA: sampling in litigation

Pacific Gas & Electric Co., San Francisco, CA: statistics and causal inference in litigation

Paul, Hastings, Janofsky & Walker LLP, Washington, DC: intellectual property litigation (client Capital One)

Phillips & Cohen LLP, San Francisco, CA: statistical inference in *Qui Tam* litigation

Porter & Hedges, LLP, Houston, TX: sampling in litigation

Schlumberger-Doll Research, Ridgefield, CT: inverse problems, signal processing

Robins Kaplan LLP: *Qui Tam* litigation

Shearman & Sterling, Washington, DC: survival analysis in litigation

Skadden, Arps, Slate, Meagher & Flom LLP, San Francisco, CA: case-control studies in litigation

Spector Roseman Kodroff & Willis, P.C., Philadelphia, PA: *Qui Tam* litigation

Spriggs & Hollingsworth, Washington, DC: environmental litigation

State of Illinois, Monroe County State's Attorney, Waterloo, IL: evidence in capital prosecution

St. Paul Fire and Marine Insurance Company, Baltimore, MD: projecting tort liability

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Susman Godfrey, LLP, Los Angeles, CA

Travis County, TX: design of auditable voting systems

United Faculty of Florida, Tallahassee, FL: teaching evaluations in academic employment decisions

University of Southern California School of Law, Los Angeles, CA: teaching evaluations

U.S. Attorney's Office, Northern District of California: ethnic bias in grand jury selection

U.S. Department of Agriculture, Washington, D.C.: fairness in lending, import restrictions and risk assessment

U.S. Department of Commerce, Bureau of the Census, Washington, D.C.: estimation and modeling

U.S. Department of Housing and Urban Development, Washington, D.C.: disparate impact of hurricane Katrina relief program

U.S. Department of Justice, Civil Division, Federal Programs Branch, Washington, D.C.: sampling the Internet and testing Internet content filters; USDA import restrictions on cattle and beef; disparate racial impact in HUD disaster relief; fairness in lending; prevalence of "sexting" among young adults

U.S. Department of Justice, Civil Division, San Francisco, CA: Election fraud.

U.S. Department of Veterans Affairs Medical Center, Martinez, CA: speech and non-speech hearing segregation in aging

U.S. House of Representatives, Washington, D.C.: sampling to adjust the U.S. Census

Weintraub Genshlea Chediak Law Corporation, Sacramento, CA: wage and hour class action litigation (client Tai Wah, Inc.)

Wiegel Law Group, San Francisco, CA: sampling in class action litigation (client Trinity Management Services)

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Wilkinson Walsh, Washington, DC: sampling and extrapolation (client Bayer)

Willoughby, Stuart & Bening, San Jose, CA: insurance litigation

Winston & Strawn LLP, Chicago, IL: consumer class action litigation

Zimmerman Reed, Scottsdale, AZ: consumer class action litigation

### **Testimony (incomplete prior to 2003)**

54. **December 2020.** Vicky Maldonado and Justin Carter, Individually and on behalf of themselves and all others similarly situated, v. Apple Inc, Appicare Services Company, Inc., and Apple CSC, Inc. (US District Court, Northern District of California, San Francisco Division, Case 3:16-cv-04067-WHO) Deposition.
  
53. **November 2020.** University Faculty of Florida and University of Florida, (American Arbitration Association before Arbitrator Mark Lurie, Grievance No. 0625-000121) Arbitration.
  
52. **September 2020.** Donna Curling, et al., v. Brad Raffensperger, et al., (U.S. District Court, Northern District of Georgia, Atlanta Division, Case 1:17-cv-2989-AT) Trial.
  
51. **August 2020.** Pacific Life & Annuity Company and Pacific Life Insurance Company v. The Bank of New York Mellon (U.S. District Court, Southern District of New York, Case 17-CV-1388-KPF) Deposition.
  
50. **January 2020.** Coordination proceeding Special Title [Rule 1550(b)] Essure Product Cases, (Superior Court of California, County of Alameda, Case JCCP 4887) Deposition.

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49. **May 2019.** A. Bolde v. Navistar, Inc., Vaso Express, Inc., A. Karapetyan, and Does 1–100, (Superior Court of California, County of Los Angeles, Department 2, Case BC6743) Deposition.
48. **April 2019.** Testimony before the U.S. Election Assistance Commission regarding the Voluntary Voting Systems Guidelines (VVSG), version 2.0. Salt Lake City, UT. Public testimony. <https://www.eac.gov/media/video-player-us-eac-public-hearing-042319/>
47. **December 2018.** Phoenix Light SF Ltd., in its own right and the right of Blue Heron Funding V Ltd., Blue Heron Funding VI Ltd., Blue Heron Funding VII Ltd., Kleros Preferred Funding V PLC, Silver Elms CDO PLC, Silver Elms CDO II Ltd., C-BASS CBO XVII Ltd., C-BASS CBO XIV Ltd. and each of Blue Heron Funding V Ltd., Blue Heron Funding VI Ltd., Blue Heron Funding VII Ltd., Kleros Preferred Funding V PLC, Silver Elms CDO PLC, Silver Elms CDO II Ltd., C-BASS CBO XVII Ltd. and C-BASS CBO XIV Ltd., in their own right, *vs.* The Bank of New York Mellon. (U.S. District Court, Southern District of New York, Case 14-CV-10104 (VEC)) Deposition.
46. **November 2018.** United States of America and State of New York, *ex rel.* Edward Lacey, *vs.* Visiting Nurse Service of New York. (U.S. District Court, Southern District of New York, Case 14-CV-5739 (AJN)) Deposition.
45. **August 2018.** Delores James *vs.* University of Florida (Grievances # 0817-00108 and 1117-00109) Arbitration.
44. **July 2018.** Testimony to the State of California Little Hoover Commission. Video: <http://www.lhc.ca.gov/report/voting-equipment-security>. Written testimony : <https://www.stat.berkeley.edu/~stark/Preprints/lhs18.pdf>

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43. **July 2018.** United States of America, *ex rel.* Stephen A. Krahling and Joan A. Wlochowski, *vs.* Merck & Co., Inc. (U.S. District Court, Eastern District of Pennsylvania, Case 10-4374 (CDJ)) and *In Re:* Merck Mumps Vaccine Antitrust Litigation (Master File No. 12-3555 (CDJ)) Deposition.
42. **April 2018.** Ryerson University *vs.* The Ryerson Faculty Association re FCS & Related Issues (2018 CanLII 58446) Arbitration.
41. **August 2017.** Application of California-American Water Company (U210W) for Authorization to Modify Conservation and Rationing Rules, Rate Design, and Other Related Issues for the Monterey District (Public Utility Commission of the State of California, Application 15-07-019) Hearing.
40. **July 2017.** United States, the States of California, Delaware, Florida, Illinois, Indiana, Nevada, New Mexico, New York, and Tennessee, the Commonwealths Of Massachusetts and Virginia, and The District Of Columbia, *ex rel.* John Hendrix, *vs.* J-M Manufacturing Company, Inc., d/b/a JM Eagle, a Delaware corporation, and Formosa Plastics Corporation, U.S.A., a Delaware corporation (U.S. District Court, Central District of California, Case ED CV 06-00055-GW) Deposition.
39. **March 2017.** The People of the State of California *vs.* Keegan Lee Czirban, Richard Allen, Filoberto Pablo Alvidrez, Jaqwayne Bryant, Dale Gabriel Burnell, Juan Pablo Cardona aka Juan Luna-Cardona, Miguel Colina, Emmanuel Cordova, Ramon Duenas, Connie Renee Fields, Anisa Sakari Fortenberry, Louie Frank Gamboa, Cynthia Marie Harrell, Briana Hawkins, Jeremiah James Johnson, Kieth Carl Knutson, Mark Alex Mallory, Brian McMahon, David Moore, Marquise Lamar Owens, Mitkayem Dean Robinson, Patrice Sanders, and Seth Rui Sears. (Superior Court of the State of California, County of Contra Costa, 05-151662-4 and associated cases) Trial.

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38. **March 2017.** Kelly Brunarski and Yvette Harmon *vs.* Miami University. (U.S. District Court, Southern District of Ohio, Western Division, 1:16-cv-0311) Deposition.
  
37. **January 2017.** The Western and Southern Life Insurance Company, et al. *vs.* The Bank of New York Mellon. (Court Of Common Pleas, Hamilton County, Ohio, A1302490) Trial.
  
36. **December 2016.** Fixed Income Shares: Series M, Lvs II LLC, PCM Fund, Inc., PIMCO Absolute Return Strategy II Master Fund LDC, PIMCO Absolutereturnstrategy III Master Fund LDC, PIMCO Absolute Return Strategy III Overlay Master Fund Ltd., PIMCO Absolute Return Strategy IV Master Fund LDC, PIMCO Absolute Return Strategy V Master Fund LDC, PIMCO Bermuda Trust: PIMCO Bermuda Foreign Low Duration Fund, PIMCO Bermuda Trust: PIMCO Bermuda U.S. Low Duration Fund, PIMCO Cayman Spc Limited, PIMCO Cayman Japan Coreplus Segregated Portfolio, PIMCO Cayman Trust: PIMCO Cayman Global Advantage Bond Fund, PIMCO Cayman Trust: PIMCO Cayman Global Aggregate Ex-Japan (Yen-Hedged) Bond Fund II, PIMCO Cayman Trust: PIMCO Cayman Global Aggregate Exjapan (Yen-Hedged) Income Fund, PIMCO Cayman Trust: PIMCO Cayman Global Aggregate Ex-Japan Bond Fund, PIMCO Cayman Trust: PIMCO Cayman Global Bond (Nzdhedged) Fund, PIMCO Dynamic Credit Income Fund, PIMCO ETF Trust, PIMCO Total Return Active Exchange-Traded Fund, PIMCO Funds: Global Investors Series PLC, Diversified Income Fund, PIMCO Funds: Global Investors Series PLC, Global Bond Fund, PIMCO Funds: Global Investors Series PLC, Global Investment Grade Credit Fund, PIMCO Funds: Global Investors Series PLC, Income Fund, PIMCO Funds: Global Investors Series PLC, PIMCO Credit Absolute Return Fund, PIMCO Funds: Global Investors Series PLC, Unconstrained Bond Fund, PIMCO Funds: PIMCO Commodities Plus Strategy Fund, PIMCO Funds: PIMCO Commodity Real Return Strategy Fund, PIMCO Funds: PIMCO Credit Absolute Return Fund, PIMCO Funds: PIMCO Diversified Income Fund, PIMCO Funds: PIMCO Floating Income Fund, PIMCO Funds: PIMCO



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Foreign Bond Fund (Unhedged), PIMCO Funds: PIMCO Global Advantage Strategy Bond Fund, PIMCO Funds: PIMCO Global Bond Fund (Unhedged), PIMCO Funds: PIMCO Income Fund, PIMCO Funds: PIMCO International Stocksplus AR Strategy Fund (U.S. Dollarhedged), PIMCO Funds: PIMCO Investment Grade Corporate Bond Fund, PIMCO Funds: PIMCO Low Duration Fund, PIMCO Funds: PIMCO Low Duration Fund II, PIMCO Funds: PIMCO Low Duration Fund III, PIMCO Funds: PIMCO Real Return Fund, PIMCO Funds: PIMCO Short-Term Fund, PIMCO Funds: PIMCO Total Return Fund, PIMCO Funds: PIMCO Unconstrained Bond Fund, PIMCO Funds: PIMCO Worldwide Fundamental Advantage AR Strategy Fund, PIMCO Funds, Private Account Portfolio Series Emerging Markets Portfolio, PIMCO Funds: Private Account Portfolio Series International Portfolio, PIMCO Funds: Private Account Portfolio Series Mortgage Portfolio, PIMCO Funds: Private Account Portfolio Series Short-Term Portfolio, PIMCO Funds: Private Account Portfolio Series U.S. Government Sector Portfolio, PIMCO Multi-Sector Strategy Fund Ltd., PIMCO Offshore Funds - PIMCO Absolute Return Strategy IV Efund, PIMCO Variable Insurance Trust: PIMCO Global Advantage Strategy Bond Portfolio, PIMCO Variable Insurance Trust: PIMCO Global Bond Portfolio (Unhedged), PIMCO Variable Insurance Trust: PIMCO Low Duration Portfolio, CREF Bond Market Account, CREF Social Choice Account, TIAA Global Public Investments, MBS LLC, TIAA-CREF Bond Fund, TIAA-CREF Bond Plus Fund, TIAA-CREF Life Insurance Company, Prudential Bank & Trust, FSB, Prudential Retirement Insurance and Annuity Company, The Gibraltar Life Insurance Company, Ltd., The Prudential Series Fund, LIICA RE II, Inc., Monumental Life Insurance Company Modified Separate Account, Transamerica Life Insurance Company, Transamerica Premier Life Insurance Company, Kore Advisors LP, and Sealink Funding Limited *vs.* Citibank N.A. (U.S. District Court, Southern District of New York, 14-cv-09373-JMF) Deposition.

35. **November 2016.** Jill Stein, Petitioner, *vs.* Wisconsin Elections Commission and Members of the Wisconsin Elections Commission, each and only in his or her official capacity: Mark L. Thomsen,

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Ann S. Jacobs, Beverly Gill, Julie M. Glancey, Steve King, and Don M. Millis, Respondents. (State of Wisconsin Circuit Court, Dane County, Judge Valerie Bailey-Rihn) Trial.

34. **October 2016.** Citizens Oversight, Inc., a Delaware non-profit corporation; and Raymond Lutz, an individual, *vs.* Michael Vu, San Diego Registrar of Voters; Helen N. Robbins-Meyer, San Diego County Chief Administrative Officer; County of San Diego, a public entity; and Does 10–10, Defendants. (Superior Court of California, County of San Diego–Central Division, 37-2016-00020273-CL-MC-CTL) Trial.
33. **July 2016.** *Loc Vu-Quoc vs. University of Florida.* (American Arbitration Association Case no. 01-15-0006-1052). Arbitration.
32. **July 2016.** Memorial University of Newfoundland Faculty Association *vs.* Memorial University of Newfoundland (Arbitration I15-07) Arbitration.
31. **June 2016.** Gasia Thomas, et al., *vs.* First Energy Corporation, et al. (Court Of Common Pleas, Cuyahoga County, Ohio, 13-CV-798520) Deposition.
30. **May 2016.** The Western and Southern Life Insurance Company, et al., *vs.* The Bank of New York Mellon. (Court Of Common Pleas, Hamilton County, Ohio, A1302490) Deposition.
29. **February 2016.** Palms Place, LLC, a Nevada limited liability company, *vs.* Kittrell Garlock & Associates, Architects, AIA, LTD. d/b/a KGA Architecture, a Nevada professional corporation; M.J. Dean Construction, LLC, a Nevada limited liability company; Does I through X; Roe Corporations I through X; and Roe LLC I through X, Defendants. M.J. Dean Construction, Inc., a Nevada corporation, Counterclaimant, *vs.* Palms Place, LLC, a Nevada limited liability company, Does I-X,

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Roe Corporations I-X, Boe Bonding Companies I-X, Loe Lenders I-X and Toe Tenants I-X, Counterdefendants.

Kittrell Garlock & Associates, Architects, AIA, Ltd. d/b/a KGA Architecture, a Nevada professional corporation, Counterclaimant, *vs.* Palms Place, LLC, a Nevada limited liability company, and Toes I-XV, Counterdefendants.

M.J. Dean Construction, Inc., a Nevada corporation, Third-Party Plaintiff, *vs.* Embassy Glass, Inc., a Nevada corporation; Zetian Systems, Inc., a Nevada corporation; Bombard Mechanical, LLC, a Limited Liability Company; Century Steel, Inc., a Nevada corporation; Pacific Custom Pools, Inc., a Nevada corporation; Superior Tile & Mechanical, Inc., a Nevada corporation; Mesa Mechanical, LLC, a Limited Liability Company; Dean Roofing Co., a Nevada Corporation; Does 1 through 50; Roe Corporations 1 through 50, Third-Party Defendants.

Palms Place, LLC, a Nevada limited liability company, Cross-Claimant, *vs.* Embassy Glass, Inc., a Nevada corporation; Zetian Systems, Inc., a Nevada corporation; Does 1 through 50; Roe Corporations 1 through 50, Cross-Defendants. (Nevada District Court, Clark County, Nevada, A-11-645150-C) Deposition.

28. **September 2015.** Lavastone Capitol LLC *vs.* Coventry First LLC, LST I LLC, LST II LLC, LST Holdings LTD., Montgomery Capital, Inc., Alan Buerger, Reid Buerger, Constance Buerger, and Krista Lake. (U.S. District Court, Southern District of New York, 14-CV-07139 JSR) Trial.
27. **May 2015.** Lavastone Capitol LLC *vs.* Coventry First LLC, LST I LLC, LST II LLC, LST Holdings LTD., Montgomery Capital, Inc., Alan Buerger, Reid Buerger, Constance Buerger, and Krista Lake. (U.S. District Court, Southern District of New York, 14-CV-07139 JSR) Deposition.
26. **April 2015.** Testimony before the California State Assembly Committee on Elections and Redistricting. Legislative hearing. <https://www.stat.berkeley.edu/~stark/Preprints/ab44-assembly-2015-4>

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25. **July 2014.** New Jersey Carpenters Health Fund, New Jersey Carpenters Vacation Fund, and Boilermaker Blacksmith National Pension Trust, on Behalf of Themselves and All Others Similarly Situated, *vs.* Residential Capital, LLC; Residential Funding, LLC; Residential Accredited Loans, Inc.; Bruce J. Paradis; Kenneth M. Duncan; Davee L. Olson; Ralph T. Flees; Lisa R. Lundsten; James G. Jones; David M. Bricker; James N. Young; Residential Funding Securities Corporation d/b/a GMAC RFC Securities; Goldman, Sachs & Co.; RBS Securities, Inc. f/k/a Greenwich Capital Markets, Inc. d/b/a RBS Greenwich Capital; Deutsche Bank Securities, Inc.; Citigroup Global Markets, Inc.; Credit Suisse Securities (USA) LLC; Bank of America Corporation as successor-in-interest to Merrill Lynch, Pierce, Fenner & Smith, Inc.; UBS Securities LLC; JPMorgan Chase & Co., Inc. as successor-in-interest to Bear, Stearns & Co., Inc.; and Morgan Stanley & Co., Inc. (U.S. District Court, Southern District of New York, Case 08-CV-8781 HB) Deposition.
  
24. **October 2013.** United States, the States of California, Delaware, Florida, Illinois, Indiana, Nevada, New Mexico, New York, and Tennessee, the Commonwealths Of Massachusetts and Virginia, and The District Of Columbia Ex Rel. John Hendrix, Plaintiffs, *vs.* J-M Manufacturing Company, Inc., d/b/a JM Eagle, a Delaware corporation, and Formosa Plastics Corporation, U.S.A., a Delaware corporation (U.S. District Court, Central District of California, Case ED CV 06-00055-GW) Trial.
  
23. **September 2013.** Tessera, Inc. *vs.* Advanced Micro Devices, Inc., a Delaware corporation; Spansion, LLC, a Delaware limited liability corporation; Spansion, Inc., a Delaware corporation; Spansion Technology, Inc., a Delaware corporation; Advanced Semiconductor Engineering, Inc., a Republic of China corporation; ASE (U.S.), Inc., a California corporation; ChipMOS Technologies, Inc., a Republic of China corporation; ChipMOS U.S.A., Inc., a California corporation; Siliconware Precision Industries Co., Ltd., a Republic of China corporation;

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Siliconware USA, Inc., a California corporation; STMicroelectronics N.V., a Netherlands corporation; STMicroelectronics, Inc., a Delaware corporation; STATS ChipPAC, Inc., a Delaware corporation; STATS ChipPAC (BVI), Inc., a British Virgin Islands company; STATS ChipPAC, Ltd., a Singapore company (U.S. District Court, Northern District of California, Case C 05-04063 CW) Deposition.

22. **July 2013.** United States, the States Of California, Delaware, Florida, Illinois, Indiana, Nevada, New Mexico, New York, and Tennessee, the Commonwealths Of Massachusetts And Virginia, and The District Of Columbia Ex Rel. John Hendrix, Plaintiffs, *vs.* J-M Manufacturing Company, Inc., d/b/a JM Eagle, a Delaware corporation, and Formosa Plastics Corporation, U.S.A., a Delaware corporation (U.S. District Court, Central District of California, Case ED CV 06-00055-GW) Deposition.
21. **June 2013.** Free Speech Coalition, Inc., American Society Of Media Photographers, Inc.; Michael Barone; David Connors a/k/a Dave Cummings; Thomas Hymes; Townsend Enterprises, Inc. d/b/a Sinclair Institute; C1R Distribution, LLC d/b/a Channel 1 Releasing; Barbara Alper; Carol Queen; Barbara Nitke; David Steinberg; Marie L. Levine a/k/a Nina Hartley; Dave Levingston; Betty Dodson; Carlin Ross *vs.* Eric H. Holder, Jr., Attorney General of the United States (U.S. District Court, Eastern District of Pennsylvania, Case 2:09-4607 MMB) Trial.
20. **October 2011.** Jonathan Buckheit *vs.* Tony Dennis, Dean Devlugt, Town of Atherton, County of San Mateo, Anthony Kockler and Jerry Carlson (U.S. District Court, Northern District of California, Case CV09-5000 JCS) Deposition.
19. **June 2010.** Testimony before California State Senate Committee on Elections, Reapportionment and Constitutional Amendments. Legislative hearing. <https://www.stat.berkeley.edu/~stark/Prep>

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[rints/ab2023-senate-15-6-10.htm](https://www.stat.berkeley.edu/~stark/Preprints/ab2023-senate-15-6-10.htm)

18. **April 2010.** Testimony before California State Assembly Committee on Elections and Redistricting. Legislative hearing. <https://www.stat.berkeley.edu/~stark/Preprints/ab2023-assembly-20-4-10.htm>
17. **March 2010.** Suzan Sharpley and Robert Abeling *vs.* William Long; Novato Sanitary District; Elaine Ginnold, Marin County Registrar of Voters; Does 1–10. (State of California Superior Court, County of Marin, Case CIV 096368) Trial.
16. **January 2010.** Kastanos et al. *vs.* Central Concrete Supply Co., Inc. (State of California Superior Court, County of Alameda, Lead Case No. HG 07-319366) Trial.
15. **June 2009.** Star Scientific, Inc., *vs.* R.J. Reynolds Tobacco Company, et al. (U.S. District Court, Maryland District, Northern Division, Case Nos. MJG-01 1504 and MJG-02 2504) Trial.
14. **May 2009.** Star Scientific, Inc., *vs.* R.J. Reynolds Tobacco Company, et al. (U.S. District Court, Maryland District, Northern Division, Case Nos. MJG-01 1504 and MJG-02 2504) Deposition.
13. **July 2008.** Coordination Proceeding Special Title (Rule 1550(b)) Cellphone Termination Fee Cases (State of California Superior Court, County of Alameda, Case 4332) Deposition.
12. **April 2008.** Coordination Proceeding Special Title (Rule 1550(b)) Cellphone Termination Fee Cases (State of California Superior Court, County of Alameda, Case 4332) Deposition.

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11. **August 2007.** Self-Insurers' Security Fund *vs.* Gallagher Bassett Services, Inc. (U.S. District Court, Northern District of California, Case No. C 06-02828 JSW) Deposition.
  
10. **March 2007.** Peter Wachtell *vs.* Capital One Financial Corporation and Capital One Services, Inc. (U.S. District Court, District of Idaho, Case No. CIV03-267-S-MHW) Deposition.
  
9. **November 2006.** Coordination Proceeding Special Title (Rule 1550(b)) Cellphone Termination Fee Cases (State of California Superior Court, County of Alameda, Case 4332) Deposition.
  
8. **November 2006.** ACLU *vs.* Gonzales (U.S. District Court, Eastern District of Pennsylvania, Civil Action No. 98-5591) Trial.
  
7. **August 2006.** ACLU *vs.* Gonzales (U.S. District Court, Eastern District of Pennsylvania, Civil Action No. 98-5591) Deposition.
  
6. **December 2004.** Star Scientific, Inc., *vs.* R.J. Reynolds Tobacco Company, et al. (U.S. District Court, Maryland District, Northern Division, Case Nos. MJG-01 1504 and MJG-02 2504) Trial.
  
5. **December 2003.** Richison et al. *vs.* American Cemwood Corporation (State of California Superior Court, San Joaquin County, Case No. 005532) Trial.
  
4. **December 2003.** Pacific Gas and Electric Co. *vs.* City and County of San Francisco (U.S. District Court, Northern District of California, Case No. C99-2071 VRW) Deposition.
  
3. **May 2003.** Richison et al. *vs.* American Cemwood Corporation (State of California Superior Court, San Joaquin County, Case No. 005532)

*P.B. Stark: CV*

*March 9, 2022*

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Deposition.

2. **May 1998.** Testimony before the U.S. House of Representatives Subcommittee on the Census. Legislative hearing.
1. **1997.** Testimony before the State of California Senate Committee on Natural Resources. Legislative hearing.

<https://www.stat.berkeley.edu/~stark/bio.pdf>  
Last modified March 9, 2022.



# **APPENDIX 2**

# Curling et al. v Raffensperger

In [1]:

```
import numpy as np
import scipy as sp
import pandas as pd
```

## Audit data

In [2]:

```
fn = './audit-report-November-3-2020-General-Election-2020-11-19.csv'
```

In [3]:

```
aud = pd.read_csv(fn, skiprows=17)
aud.describe()
```

Out[3]:

	Donald J. Trump	Joseph R. Biden	Jo Jorgensen	Invalid Write-In	Valid Write-in	Blank/Undervote
<b>count</b>	41881.00000	41881.00000	41881.00000	41881.00000	41881.00000	41881.00000
<b>mean</b>	58.80607	59.099377	1.494401	0.216948	0.071226	3.165015
<b>std</b>	193.27427	185.183528	4.403863	1.346462	0.484540	7.358273
<b>min</b>	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
<b>25%</b>	5.00000	10.00000	0.00000	0.00000	0.00000	0.00000
<b>50%</b>	13.00000	20.00000	0.00000	0.00000	0.00000	0.00000
<b>75%</b>	34.00000	40.00000	1.00000	0.00000	0.00000	1.00000
<b>max</b>	7550.00000	7078.00000	109.00000	134.00000	28.00000	50.00000

In [4]:

```
aud.head()
```

Out[4]:

	Jurisdiction Name	Batch Name	Batch Type	Donald J. Trump	Joseph R. Biden	Jo Jorgensen	Invalid Write-In	Valid Write-in	Blank/Undervote	C
<b>0</b>	APPLING	01	Absentee By Mail	23	1	0	0	0	1	
<b>1</b>	APPLING	02	Absentee By Mail	22	3	0	0	0	0	
<b>2</b>	APPLING	03	Absentee By Mail	19	5	0	0	0	1	
<b>3</b>	APPLING	04	Absentee By Mail	21	4	0	0	0	0	
<b>4</b>	APPLING	05	Absentee By Mail	24	1	0	0	0	0	

In [5]:

```
subset = ['Jurisdiction Name', 'Donald J. Trump', 'Joseph R. Biden', 'Jo Jorgense',
          'Invalid Write-In', 'Valid Write-iin', 'Blank/Undervote', 'Overvote']
print(f''duplicated data within counties {np.sum(aud.duplicated(subset=subset,
```

duplicated data within counties 16807

In [6]:

```
# first FULTON in spreadsheet is line 18582. Last is 20,497
print(sum(aud['Jurisdiction Name'] == 'FULTON'), 20497-18582+1)
```

1916 1916

In [7]:

```
fulton = aud[aud['Jurisdiction Name'] == 'FULTON']
cands = ['Donald J. Trump', 'Joseph R. Biden', 'Jo Jorgensen', \
         'Invalid Write-In', 'Valid Write-iin', 'Blank/Undervote', 'Overvote']

def filter_by_values(domain : pd.DataFrame, votes : list) -> pd.Series:
    filt = domain[cands[0]] == votes[0]
    for j in range(1, len(votes)):
        if votes[j] is not None:
            filt = filt & (domain[cands[j]] == votes[j])
    return filt
```

In [8]:

```
# possibly missing
miss_vals = {}
miss_vals['f_ab_s_3_b_48'] = [4, 93, 2, 0, 0, 0, 0] # marked "
miss_vals['f_ab_s_2_b_52'] = [6, 92, 0, 0, 0, 0, 0] # #128 p1
miss_vals['f_s_3_b_12_13_14'] = [12, 83, 1, 0, 0, 0, 0] # not mark
# shows mu
miss_vals['f_s_3_b_239'] = [13, 87, 0, 0, 0, 0, 0] # not mark
miss_vals['f_s_1_b_80_81_82_83_84'] = [118, 329, 3, None, None, 2, 1] # two writ
miss_vals['f_ab_s_3_b_260'] = [30, 66, 0, 0, 0, 0, 0] # mode not
miss_vals['f_ed_ap01A_1'] = [84, 62, 6, None, None, 1, 0] # two writ
miss_vals['f_ab_s_3_b_179_180_181'] = [85, 224, 5, None, None, 2, 0] # one writ
miss_vals['f_ab_s_2_b_239'] = [4, 42, 0, 0, 0, 0, 0]
miss_vals['f_adv_chastain_b_12'] = [613, 605, 24, None, None, 4, 0] # 7 writei
miss_vals['f_adv_chastain_b_114'] = [613, 605, 24, None, None, 4, 0] # also has
# 605 is o
```

In [9]:

```
for label, vote in miss_vals.items():
    print(f'\nsheet: {label} {vote=}')
    display(fulton[filter_by_values(fulton, vote)])
```

sheet: f\_ab\_s\_3\_b\_48 vote=[4, 93, 2, 0, 0, 0, 0]

	Jurisdiction Name	Batch Name	Batch Type	Donald J. Trump	Joseph R. Biden	Jo Jorgensen	Invalid Write-In	Valid Write-iin	Blank/Under
19457	FULTON	Absentee Scanner 3 Ballot 162	Absentee By Mail	4	93	2	0	0	

sheet: f\_ab\_s\_2\_b\_52 vote=[6, 92, 0, 0, 0, 0, 0]

Jurisdiction Name	Batch Name	Batch Type	Donald J. Trump	Joseph R. Biden	Jo Jorgensen	Invalid Write-In	V Wr
19304	FULTON AbsenteeScanner2Batch400	Absentee By Mail	6	92	0	0	

sheet: f\_s\_3\_b\_12\_13\_14 vote=[12, 83, 1, 0, 0, 0, 0]

Jurisdiction Name	Batch Name	Batch Type	Donald J. Trump	Joseph R. Biden	Jo Jorgensen	Invalid Write-In	V Wr
19577	FULTON AbsenteeScanner3Batch253	Absentee By Mail	12	83	1	0	

sheet: f\_s\_3\_b\_239 vote=[13, 87, 0, 0, 0, 0, 0]

Jurisdiction Name	Batch Name	Batch Type	Donald J. Trump	Joseph R. Biden	Jo Jorgensen	Invalid Write-In	Valid Write-in	Blank/Undervote	Overv
-------------------	------------	------------	-----------------	-----------------	--------------	------------------	----------------	-----------------	-------

sheet: f\_s\_1\_b\_80\_81\_82\_83\_84 vote=[118, 329, 3, None, None, 2, 1]

Jurisdiction Name	Batch Name	Batch Type	Donald J. Trump	Joseph R. Biden	Jo Jorgensen	Invalid Write-In	Valid Write-in	Blank/Undervote	Overv
-------------------	------------	------------	-----------------	-----------------	--------------	------------------	----------------	-----------------	-------

sheet: f\_ab\_s\_3\_b\_260 vote=[30, 66, 0, 0, 0, 0, 0]

Jurisdiction Name	Batch Name	Batch Type	Donald J. Trump	Joseph R. Biden	Jo Jorgensen	Invalid Write-In	Valid Write-in	Blank/Undervote	Overv
-------------------	------------	------------	-----------------	-----------------	--------------	------------------	----------------	-----------------	-------

sheet: f\_ed\_ap01A\_1 vote=[84, 62, 6, None, None, 1, 0]

Jurisdiction Name	Batch Name	Batch Type	Donald J. Trump	Joseph R. Biden	Jo Jorgensen	Invalid Write-In	Valid Write-in	Blank/Undervote	Overv
-------------------	------------	------------	-----------------	-----------------	--------------	------------------	----------------	-----------------	-------

sheet: f\_ab\_s\_3\_b\_179\_180\_181 vote=[85, 224, 5, None, None, 2, 0]

Jurisdiction Name	Batch Name	Batch Type	Donald J. Trump	Joseph R. Biden	Jo Jorgensen	Invalid Write-In	Valid Write-in	Blank/Undervote	Overv
-------------------	------------	------------	-----------------	-----------------	--------------	------------------	----------------	-----------------	-------

sheet: f\_ab\_s\_2\_b\_239 vote=[4, 42, 0, 0, 0, 0, 0]

Jurisdiction Name	Batch Name	Batch Type	Donald J. Trump	Joseph R. Biden	Jo Jorgensen	Invalid Write-In	Valid Write-in	Blank/Undervote	Overv
-------------------	------------	------------	-----------------	-----------------	--------------	------------------	----------------	-----------------	-------

sheet: f\_adv\_chastain\_b\_12 vote=[613, 605, 24, None, None, 4, 0]

Jurisdiction Name	Batch Name	Batch Type	Donald J. Trump	Joseph R. Biden	Jo Jorgensen	Invalid Write-In	Valid Write-in	Blank/Undervote	Overv
-------------------	------------	------------	-----------------	-----------------	--------------	------------------	----------------	-----------------	-------

sheet: f\_adv\_chastain\_b\_114 vote=[613, 605, 24, None, None, 4, 0]

Jurisdiction Name	Batch Name	Batch Type	Donald J. Trump	Joseph R. Biden	Jo Jorgensen	Invalid Write-In	Valid Write-in	Blank/Undervote	Overv
-------------------	------------	------------	-----------------	-----------------	--------------	------------------	----------------	-----------------	-------

In [10]:

```
for c in cand:
```

```
print(f'{c}: {np.sum(fulton[c])}')
```

Donald J. Trump: 137620  
Joseph R. Biden: 381179  
Jo Jorgensen: 6494  
Invalid Write-In: 836  
Valid Write-in: 375  
Blank/Undervote: 1439  
Overvote: 92

In [11]:

```
tots = np.zeros(len(cands))
for s, v in miss_vals.items():
    for i in range(len(cands)):
        tots[i] += (v[i] if v[i] is not None else 0)

print(f'[{int(t) for t in tots}] {np.sum(tots[0:3]) :0.0f} {np.sum(tots) :0.0f}')
```

[1582, 2288, 65, 0, 0, 13, 1] 3935 3949

## Compare with original result

In [12]:

```
orig_N = 524659 # per audit report
aud_N = 525293 # per audit report
miss_N = int(np.sum(tots[0:3])) # batch sheets not present in the spreadsheet
overall_miss = aud_N+miss_N - orig_N
print(f'{aud_N-orig_N=} {overall_miss=} ' +\
      f'original error: {100*(aud_N-orig_N)/orig_N :0.2f}% overall error: {100*
```

aud\_N-orig\_N=634 overall\_miss=4569 original error: 0.12% overall error: 0.87%

## Original scan versus machine recount

In [13]:

```
orig_fn = './orig.csv'
recount_fn = './recount.csv'
```

In [14]:

```
orig = pd.read_csv(orig_fn, header=1)
recount = pd.read_csv(recount_fn, header=1)
```

In [15]:

```
orig.head()
```

Out[15]:

	County	Registered Voters	Election Day Votes	Advanced Voting Votes	Absentee by Mail Votes	Provisional Votes	Total Votes	Election Day Votes.1	Advanced Voting Votes.1	At
0	01A	3694	41	145	56	5	247	160	1662	
1	01B	4327	79	159	62	1	301	242	1842	
2	01C	1908	21	20	8	0	49	180	372	
3	01D	754	7	13	13	1	34	24	284	
4	01E	3720	40	167	79	1	287	101	1559	

In [16]:

```
recount.head()
```

Out[16]:

	County	Registered Voters	Election Day Votes	Advanced Voting Votes	Absentee by Mail Votes	Provisional Votes	Total Votes	Election Day Votes.1	Advanced Voting Votes.1	At
0	01A	3694	41	147	55	4	247	160	1669	
1	01B	4327	79	161	61	1	302	242	1847	
2	01C	1908	21	20	8	0	49	180	374	
3	01D	754	7	13	13	0	33	24	284	
4	01E	3720	35	168	80	1	284	93	1556	

In [17]:

```
orig[orig['County'] == 'RW01']
```

Out[17]:

	County	Registered Voters	Election Day Votes	Advanced Voting Votes	Absentee by Mail Votes	Provisional Votes	Total Votes	Election Day Votes.1	Advanced Voting Votes.1
268	RW01	5010	193	1455	619	9	2276	88	1003

In [18]:

```
recount[recount['County'] == 'RW01']
```

Out[18]:

	County	Registered Voters	Election Day Votes	Advanced Voting Votes	Absentee by Mail Votes	Provisional Votes	Total Votes	Election Day Votes.1	Advanced Voting Votes.1
268	RW01	5010	162	1487	619	5	2273	73	1015

In [19]:

```
fulton[fulton['Batch Name'].str.contains('RW01', case=False)]
```

Out[19]:

	Jurisdiction Name	Batch Name	Batch Type	Donald J. Trump	Joseph R. Biden	Jo Jorgensen	Invalid Write-In	Valid Write-in	Blank/Undervote
20164	FULTON	rw01	Election Day	31	15	2	0	0	(
20165	FULTON	RW01	Election Day	22	18	4	0	0	(
20166	FULTON	RW01-3	Election Day	190	55	5	0	0	(

In [20]:

```
fulton[fulton['Batch Name'].str.contains('RW01', case=False)].agg(sum)
```

Out[20]:

```

Jurisdiction Name      FULTONFULTONFULTON
Batch Name              rw01RW01 RW01-3
Batch Type              Election DayElection DayElection Day
Donald J. Trump                243
Joseph R. Biden                88

```

```
Jo Jorgensen 11
Invalid Write-In 0
Valid Write-in 0
Blank/Undervote 0
Overvote 0
dtype: object
```

## Version information

In [21]:

```
packs = ['np', 'sp', 'pd']
for p in packs:
    print(f'{p} {eval(p+".__version__")}')

```

np 1.21.2

sp 1.7.3

pd 1.3.5

# **APPENDIX 3**



# Audit Board Batch Sheet

*Absentee*  
*Scanner 3*  
*Batch 48*  
*TABLE*  
*118*

County Fulton

Batch Name Scanner 3(48)

Batch Type:  Absentee  Advance  Election Day  Provisional  Other

Was the container sealed when received by the audit board?  Yes

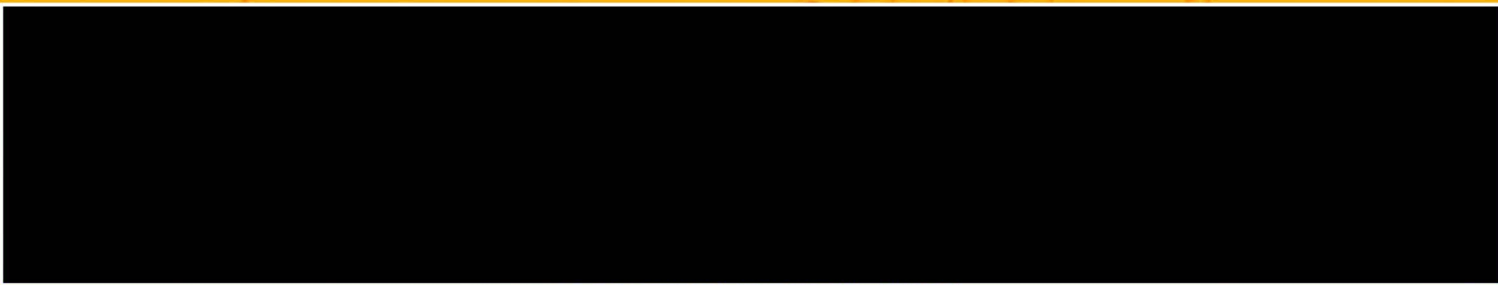
Candidates	Enter Stack Totals
Donald J. Trump	4
Joseph R. Biden	93
Jo Jorgensen	2
Overvote	
Blank/Undervote	

### Number of Ballots sent to the Vote Review Panel (if any)

Write-In	
Duplicated	
Undetermined	

When work is completed, return all ballots (except Vote Review Panel ballots) to the ballot container and seal container.

Was the container resealed by the audit board?  Yes



- Delivered Vote Review Panel ballots (if any)
- Entered tallies into Arlo
- \_\_\_\_\_ Initials of check in/out station member

**Absentee Scanner** #128  
**Batch 52**

**Audit Board Batch Sheet**

County Fulton

Batch Name Sc#2 (52)

Batch Type:  Absentee  Advance  Election Day  Provisional  Other

Was the container sealed when received by the audit board?  Yes

Candidates	Enter Stack Totals
Donald J. Trump	6
Joseph R. Biden	92
Jo Jorgensen	0
Overvote	0
Blank/Undervote	0

10+10+10+10+10+10+10+10  
 +10+2

**Number of Ballots sent to the Vote Review Panel (if any)**

Write-In	0
Duplicated	0
Undetermined	0

When work is completed, return all ballots (except Vote Review Panel ballots) to the ballot container and seal container.

Was the container resealed by the audit board?  Yes



**Check in/Out Station**

- Recorded batch return on Ballot Container Inventory Sheet
- Delivered Vote Review Panel ballots (if any)
- Entered tallies into Arlo

\_\_\_\_\_ Initials of check in/out station member

### Audit Board Batch Sheet

County FULLON

Batch Name SCANNER 3 (12) (13) + (14)

Batch Type:  Absentee  Advance  Election Day  Provisional  Other

Was the container sealed when received by the audit board?  Yes

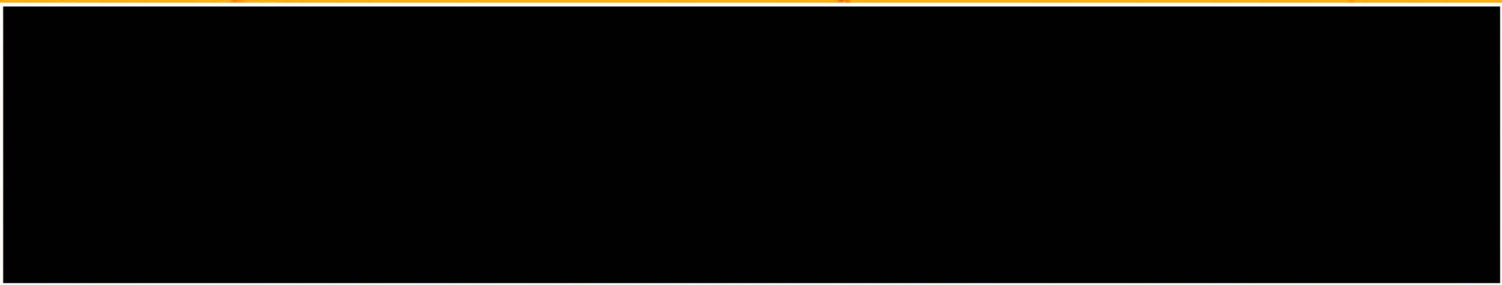
Candidates	Enter Stack Totals
Donald J. Trump	12
Joseph R. Biden	83
Jo Jorgensen	1
Overvote	
Blank/Undervote	

**Number of Ballots sent to the Vote Review Panel (if any)**

Write-In	
Duplicated	
Undetermined	

When work is completed, return all ballots (except Vote Review Panel ballots) to the ballot container and seal container.

Was the container resealed by the audit board?  Yes



- Delivered Vote Review Panel ballots (if any)
  - Entered tallies into Arlo
- \_\_\_\_\_ Initials of check in/out station member

# Audit Board Batch Sheet

County Fulton Co.

Batch Name 239 SCAS3

Batch Type:  Absentee  Advance  Election Day  Provisional  Other

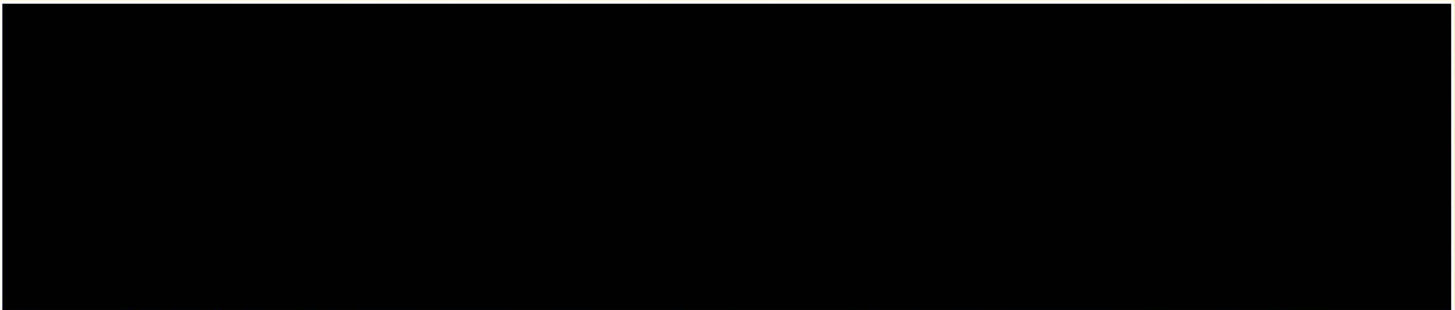
Was the container sealed when received by the audit board?  Yes

Candidates	Enter Stack Totals
Donald J. Trump	100 13
Joseph R. Biden	87
Jo Jorgensen	
Overvote	
Blank/Undervote	

### Number of Ballots sent to the Vote Review Panel (if any)

Write-In	
Duplicated	
Undetermined	

When work is completed, return all ballots (except Vote Review Panel ballots) to the ballot container and seal container.



- Recorded batch return on Ballot Container Inventory Sheet
  - Delivered Vote Review Panel ballots (if any)
  - Entered tallies into Arlo
- \_\_\_\_\_ Initials of check in/out station member

Scanner 1 Batch 80-84  
5

### Audit Board Batch Sheet

County Fulton

Batch Name SC#1(80) 81-82-83-84

Batch Type:  Absentee  Advance  Election Day  Provisional  Other

Was the container sealed when received by the audit board?  Yes

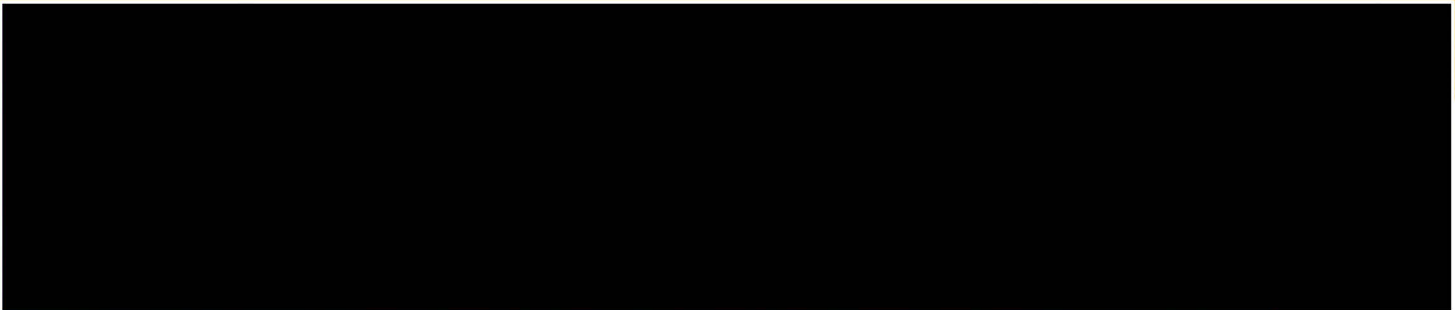
Candidates	Enter Stack Totals
Donald J. Trump	118
Joseph R. Biden	329
Jo Jorgensen	3
Overvote	1
Blank/Undervote	2

#### Number of Ballots sent to the Vote Review Panel (if any)

Write-In	2
Duplicated	0
Undetermined	0

When work is completed, return all ballots (except Vote Review Panel ballots) to the ballot container and seal container.

Was the container resealed by the audit board?  Yes



\_\_\_\_\_ Initials of check in/out station member

# Audit Board Batch Sheet

County Fulton County

Batch Name Scanner 3 (260)

Batch Type:  Absentee  Advance  Election Day  Provisional  Other

Was the container sealed when received by the audit board?  Yes

Candidates	Enter Stack Totals
Donald J. Trump	30
Joseph R. Biden	66
Jo Jorgensen	
Overvote	
Blank/Undervote	

## Number of Ballots sent to the Vote Review Panel (if any)

Write-In	
Duplicated	
Undetermined	

When work is completed, return all ballots (except Vote Review Panel ballots) to the ballot container and seal container.



### Check In/Out Station

- Recorded batch return on Ballot Container Inventory Sheet
  - Delivered Vote Review Panel ballots (if any)
  - Entered tallies into Arlo
- \_\_\_\_\_ Initials of check in/out station member

# Audit Board Batch Sheet

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County FULTON

Batch Name AP01A - 1

Batch Type:  Absentee  Advance  Election Day  Provisional  Other

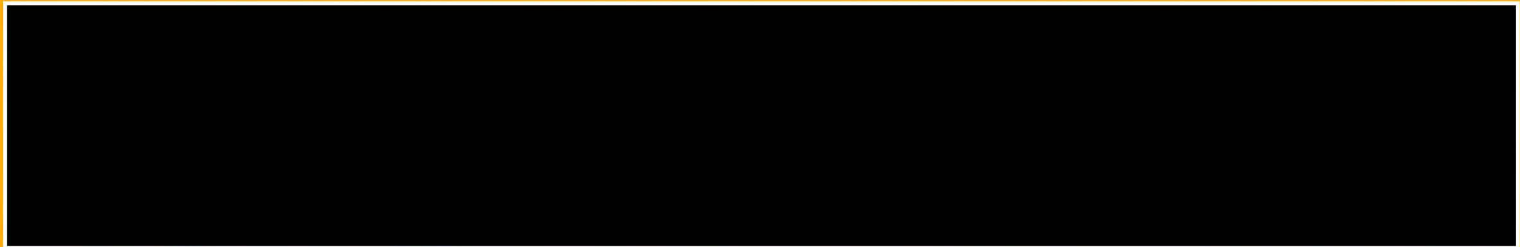
Was the container sealed when received by the audit board?  Yes

Candidates	Enter Stack Totals
Donald J. Trump	84
Joseph R. Biden	62
Jo Jorgensen	6
Overvote	0
Blank/Undervote	1

### Number of Ballots sent to the Vote Review Panel (if any)

Write-In	2
Duplicated	0
Undetermined	0

When work is completed, return all ballots (except Vote Review Panel ballots) to the ballot container and seal container.



### Check In/Out Station

- Recorded batch return on Ballot Container Inventory Sheet
- Delivered Vote Review Panel ballots (if any)
- Entered tallies into Arlo

\_\_\_\_\_ Initials of check in/out station member

# Audit Board Batch Sheet

County Fulton

Batch Name SC #3 # 179 to 181

Batch Type:  Absentee  Advance  Election Day  Provisional  Other

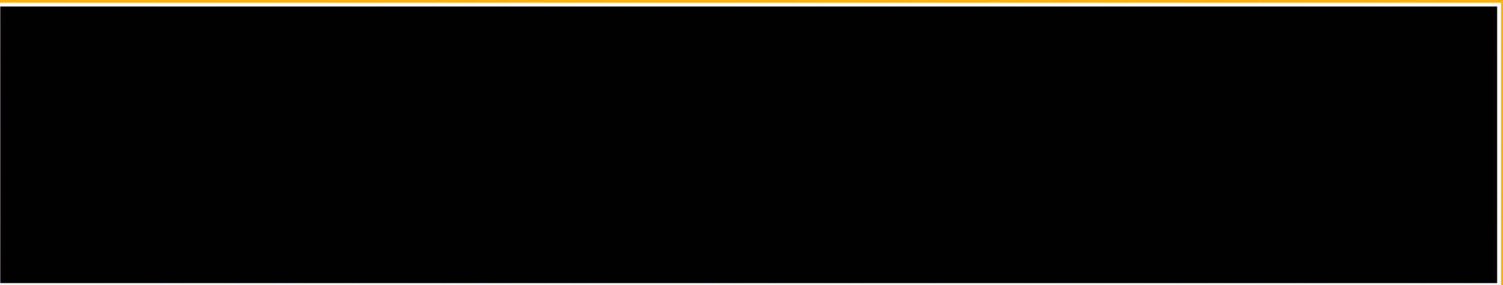
Was the container sealed when received by the audit board?  Yes

Candidates	Enter Stack Totals
Donald J. Trump	$\begin{array}{r} 75 \\ + 10 \\ \hline 85 \end{array}$ 85
Joseph R. Biden	$\begin{array}{r} 100 \\ 100 \\ 24 \\ \hline 224 \end{array}$ 224
Jo Jorgensen	5
Overvote	0
Blank/Undervote	2

## Number of Ballots sent to the Vote Review Panel (if any)

Write-In	1
Duplicated	0
Undetermined	0

When work is completed, return all ballots (except Vote Review Panel ballots) to the ballot container and seal container.



### Check In/Out Station

- Recorded batch return on Ballot Container Inventory Sheet
- Delivered Vote Review Panel ballots (if any)
- Entered tallies into Arlo

\_\_\_\_\_ Initials of check in/out station member



### Audit Board Batch Sheet

County FULTON 239  
 Batch Name SCANNER 2  
 Batch Type:  Absentee  Advance  Election Day  Provisional  Other

Was the container sealed when received by the audit board?  Yes

Candidates	Enter Stack Totals
Donald J. Trump	4
Joseph R. Biden	42
Jo Jorgensen	
Overvote	
Blank/Undervote	

**Number of Ballots sent to the Vote Review Panel (if any)**

Write-In	
Duplicated	
Undetermined	

When work is completed, return all ballots (except Vote Review Panel ballots) to the ballot container and seal container.

Was the container resealed by the audit board?  Yes



**Check in/Out Station**

- Recorded batch return on Ballot Container Inventory Sheet
  - Delivered Vote Review Panel ballots (if any)
  - Entered tallies into Arlo
- \_\_\_\_\_ Initials of check in/out station member

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**Audit Board Batch Sheet**

County FULTON

Batch Name ~~ATLANTA~~ | Chastain

Batch Type:  Absentee  Advance  Election Day  Provisional  Other

Was the container sealed when received by the audit board?  Yes

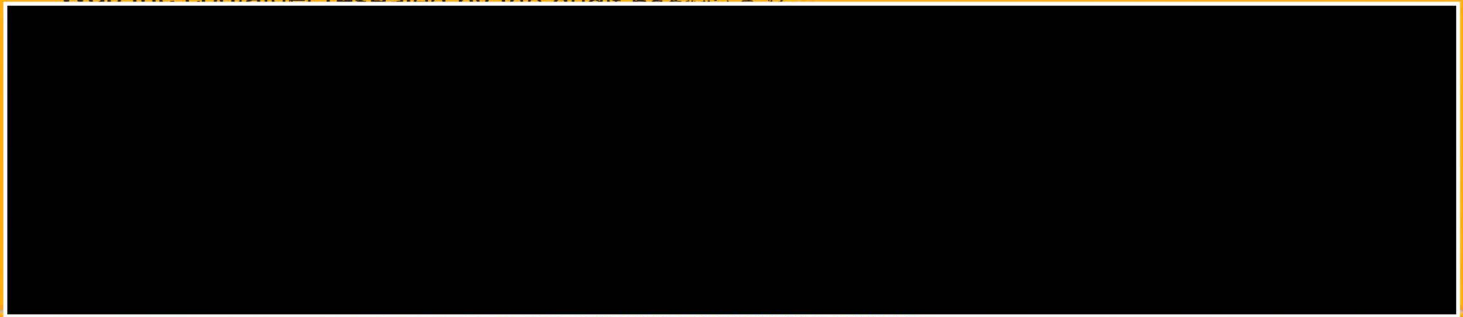
Candidates	Enter Stack Totals
Donald J. Trump	613
Joseph R. Biden	605
Jo Jorgensen	24
Overvote	0
Blank/Undervote	4

**Number of Ballots sent to the Vote Review Panel (if any)**

Write-In	7
Duplicated	0
Undetermined	0

When work is completed, return all ballots (except Vote Review Panel ballots) to the ballot container and seal container.

Was the container resealed by the audit board?  Yes



- Delivered Vote Review Panel ballots (if any)
  - Entered tallies into Arlo
- \_\_\_\_ Initials of check in/out station member

# Audit Board Batch Sheet

~~114~~  
12

County Fulton

Batch Name Chastain

Batch Type:  Absentee  Advance  Election Day  Provisional  Other

Jorgensen  
11  
+11  
22  
2  
24

Was the container sealed when received by the audit board?  Yes

Candidates	Enter Stack Totals
Donald J. Trump	
Joseph R. Biden	
Jo Jorgensen	<del>    </del>
Overvote	⊖ ✓
Blank/Undervote	<del>    </del>

Trump  
5  
100  
105  
100  
205  
50  
255  
256  
100  
356  
100  
456  
40  
496  
7  
503  
100  
603  
10  
613

Biden  
7  
100  
107  
100  
207  
20  
227  
4  
231  
100  
331  
100  
431  
40  
471  
4  
475  
100  
575  
30

Number of Ballots sent to the Vote Review Panel (if any)

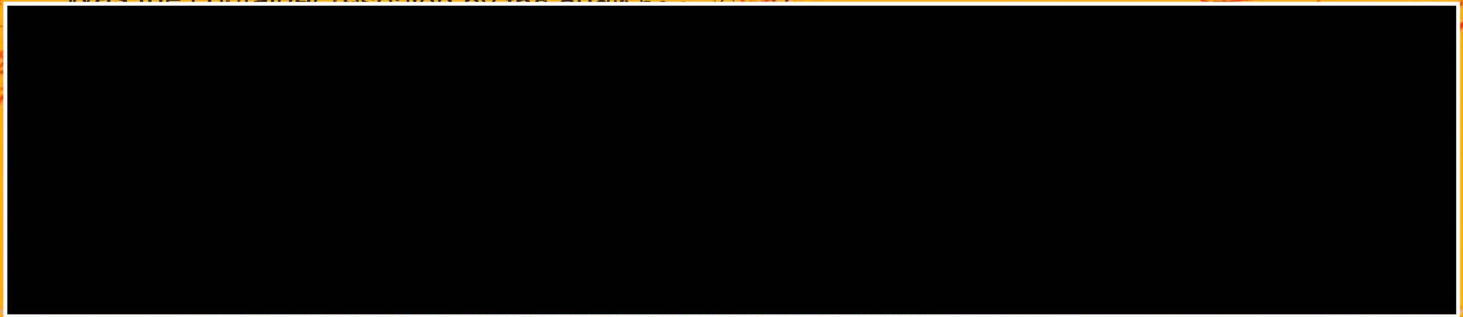
Write-In	<del>    </del>
Duplicated	⊖ ✓
Undetermined	⊖ ✓

Blank  
2  
+2  
4

When work is completed, return all ballots (except Vote Review Panel ballots) to the ballot container and seal container.

Write-In  
+1  
✓

Was the container sealed by the audit board?  Yes



- Delivered Vote Review Panel ballots (if any)
- Entered tallies into Arlo
- \_\_\_\_\_ Initials of check in/out station member

# **APPENDIX 4**



STATE OF GEORGIA  
OFFICE OF THE GOVERNOR  
ATLANTA 30334-0090

Brian P. Kemp  
GOVERNOR

November 17, 2021

***VIA ELECTRONIC MAIL***

Ms. Rebecca N. Sullivan, Acting Chair  
200 Piedmont Avenue SE  
Suite 1804, West Tower  
Atlanta, Georgia 30334

Ms. Sara Tindall Ghazal  
4880 Lower Roswell Rd  
Suite 165-328  
Marietta, Georgia 30068

Mr. Matthew Mashburn  
P.O. Box 451  
Cartersville, Georgia 30120

Ms. Anh Le  
P.O. Box 4008  
Decatur, Georgia 3003

Dear Members of the State Election Board,

I write to refer the following matter to the Board for its review and consideration. As you know, I called on Georgians with information about inconsistencies or complaints regarding the 2020 election to notify the proper state authorities. To date, the complaint outlined below is the only instance where a complainant has referred an issue to my office *and* provided all requested information for me and my staff to fully evaluate its veracity.

On September 3, 2021, Mr. Joseph Rossi, a retired executive from Houston County, Georgia, contacted my office. Mr. Rossi presented an analysis of the 2020 Risk-Limiting Audit Report ("RLA Report") data, noting 36 inconsistencies reported by Fulton County.<sup>1</sup> The analysis was created by him and attorney Jack James who volunteered their own time, without compensation, to review thousands of ballot images, audit tally sheets, and other data to double-check the work of the county. Their dedication to this immense task is commendable.

The 36 inconsistencies noted by Mr. Rossi are factual in nature, pose no underlying theories outside of the reported data, and could not be explained by my office after a thorough review detailed below. The purpose of this letter is to convey these inconsistencies to the Board and request them to be explained or corrected.

To be clear, this letter does not purport to dispute or contest the outcome of the 2020 election, but rather to highlight apparent inconsistencies discovered in the RLA Report data.

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<sup>1</sup> Specifically, Mr. Rossi analyzed the document titled "Detailed Audit Report with Results from all Batch Sheets (Excel)" which is published on the Secretary of State website.

State Election Board  
November 17, 2021  
Page 2 of 2

Mr. Rossi requested my office review his findings and take whatever action may be appropriate to address his concerns. Mr. Rossi never alleged the outcome of the election was in question or asked me to act beyond my constitutional or statutory powers as Governor – the authority to oversee elections in Georgia lies with the State Election Board and the Secretary of State.

To determine whether it was appropriate to refer Mr. Rossi's claims to you, my office tested the veracity of his work by independently repeating the research Mr. Rossi conducted on each of his 36 claims. My office analyzed each of Mr. Rossi's 36 claims against the RLA Report data. This process was extensive, required a manual review of thousands of ballot images and audit data, and took weeks to complete.

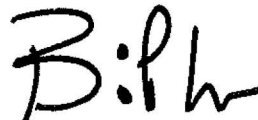
Based on that analysis, as evidenced in the attached report, I believe a referral to the Board is warranted.

The data that exists in public view on the Secretary of State's website of the RLA Report does not inspire confidence. It is sloppy, inconsistent, and presents questions about what processes were used by Fulton County to arrive at the result. Though reasons for, or explanations of, Mr. Rossi's concerns may exist, they are not apparent in the RLA Report data. In reviewing this matter, I believe the Board should consider the following actions:

1. Direct investigators to review Mr. Rossi's findings, just as my office has, and order corrective action as needed to address any verified errors.
2. Determine whether any changes should be made to the RLA Report. If so, the Board should determine whether such changes adversely impact the integrity of the RLA Report as originally reported.
3. Review the audit methodology used in counties across Georgia and create a prescriptive and uniform set of rules that ensure one process is followed by all counties that result in a clear presentation of data.

As you know, I chaired this Board for nine years. During that time, we tackled many tough issues to ensure the integrity of Georgia's elections and make it easy to vote and hard to cheat. It is the responsibility of this Board to safeguard the confidence I and all my fellow Georgians must have in our elections. This is one issue where I believe this Board must act swiftly, and I urge you to do so in this case.

Sincerely,

A handwritten signature in black ink, appearing to read "B: P Kemp".

Brian P. Kemp

CC:

Brad Raffensperger,  
*Georgia Secretary of State*



STATE OF GEORGIA  
OFFICE OF THE GOVERNOR  
ATLANTA 30334-0900

**REVIEW OF INCONSISTENCIES IN THE  
DATA SUPPORTING THE RISK LIMITING AUDIT REPORT**

November 17, 2021

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**OVERVIEW**

The following inconsistencies were initially discovered by Joe Rossi through comparisons of the Fulton County vote counts included in the document titled “Detailed Audit Report with Results from all Batch Sheets (Excel)” (“Detailed Audit Report”) and the ballot images obtained by the Atlanta Journal-Constitution Open Records Request (“Ballot Images”). Mr. Rossi’s analysis (“Rossi Count”) and the review conducted by the Office of the Governor (“Internal Count”) were performed by manually counting the Ballot Images for Fulton County. The Ballot Images only include absentee ballots.

Ballot Images obtained by the Atlanta Journal-Constitution Open Records Request are available at the link below:

<https://theatlantajournalconstitution.sharefile.com/share/view/s3c2d5cd44b5a42a88b6a76990379d181/fo8028b0-c150-45f5-911d-f9959144930e>

The Detailed Audit Report (audit-report-November-3-2020-General-Election-2020-11-19) is available at the link below:

[https://sos.ga.gov/index.php/elections/2020\\_general\\_election\\_risk-limiting\\_audit](https://sos.ga.gov/index.php/elections/2020_general_election_risk-limiting_audit)

Within the Detailed Audit Report and Mr. Rossi’s analysis, ballot scanners were referred to as Scanners 1 through 5. The Atlanta Journal-Constitution referred to the same scanners as Tabulator 5150 (Scanner 1), Tabulator 5160 (Scanner 2), Tabulator 5162 (Scanner 3), Tabulator 5164 (Scanner 4), and Tabulator 0729 (Scanner 5).

References to “Row XXXXX” refer to the row number listed on the Detailed Audit Report.

As used in the batch entries in the Detailed Audit Report, “I W/I” means “Invalid Write-In Vote”, “V W/U” means “Valid Write-In Vote”, and “B/U” means “Blank Vote or Undervote”.

**INCONSISTENCY 1: MISIDENTIFIED AND DUPLICATED BATCH ENTRY**

The batch entries on Row 19492 and Row 19493 are each identified as "AbsenteeScanner3Batch111" yet report different vote counts. **One of these entries appears to be misidentified.**

Additionally, Row 18786, identified as "AbsenteeScanner1Batch111," reports an identical vote count as Row 19493. One of these entries appears to be duplicated.

## Detailed Audit Report:

Row 19492: AbsenteeScanner3Batch111

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
8	90	0	0	0	0	0

Row 19493: AbsenteeScanner3Batch111

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
4	95	1	0	0	0	0

Row 18786: AbsenteeScanner1Batch111

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
8	90	0	0	0	0	0

## Rossi Count:

Absentee Scanner 3 (Tabulator 05162), Batch 111

- Count not provided by Mr. Rossi.

Absentee Scanner 1 (Tabulator 05150), Batch 111

Trump	Biden	Jorgensen	Other
9	90	0	2

## Internal Count:

Absentee Scanner 3 (Tabulator 05162), Batch 111

Trump	Biden	Jorgensen	Other
5	94	1	0

Absentee Scanner 1 (Tabulator 05150), Batch 111

Trump	Biden	Jorgensen	Other
9	90	0	2



**INCONSISTENCY 2: DUPLICATED BATCH ENTRY**

The batch entry on Row 18840, identified as "AbsenteeScanner1Batch18," reports an identical vote count as the batch entry on Row 20288, identified as "Scanner 1/18." **One of these entries appears to be duplicated.**

Detailed Audit Report:

Row 18840: AbsenteeScanner1Batch18

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
26	72	1	0	0	0	0

Row 20288: Scanner 1/18

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
26	72	1	0	0	0	0

---

Rossi Count: Absentee Scanner 1 (Tabulator 05150), Batch 18

Trump	Biden	Jorgensen	Other
26	72	0	0

---

Internal Count: Absentee Scanner 1 (Tabulator 05150), Batch 18

Trump	Biden	Jorgensen	Other
26	72	1	0

**INCONSISTENCY 3: DUPLICATED BATCH ENTRY**

The batch entry on Row 18911, identified as “AbsenteeScanner1Batch 25,” nearly matches the same vote count reported by the batch entry on Row 20296, identified as “Scanner 1 /25.” The lone exception being that Row 20296 reports an additional valid write-in vote. **One of these entries appears to be duplicated.**

Detailed Audit Report:

Row 18911: AbsenteeScanner1Batch 25

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
21	77	0	0	0	1	0

Row 20296: Scanner 1 /25

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
21	77	0	0	1	1	0

---

Rossi Count: Absentee Scanner 1 (Tabulator 05150), Batch 25

Trump	Biden	Jorgensen	Other
21	77	0	2

---

Internal Count: Absentee Scanner 1 (Tabulator 05150), Batch 25

Trump	Biden	Jorgensen	Other
21	77	0	2

**INCONSISTENCY 4: BATCH ENTRIES REFLECTING 100% VOTE COUNTS FOR ONE CANDIDATE**

The batch entry on Row 19120, identified as "AbsenteeScanner2Batch19," reports all 100 votes for Biden. The batch entry on Row 19131, identified as "AbsenteeScanner2Batch20," reports all 100 votes for Biden. The batch entry on Row 19142, identified as "AbsenteeScanner2Batch21," reports all 150 votes for Biden.

**The Ballot Images corresponding to Batches 19, 20, and 21, of Absentee Scanner 2 (Tabulator 05160) do not reflect unanimous vote counts for one candidate.**

Detailed Audit Report:

Row 19120: AbsenteeScanner2Batch19

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
0	100	0	0	0	0	0

Row 19131: AbsenteeScanner2Batch20

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
0	100	0	0	0	0	0

Row 19142: AbsenteeScanner2Batch21

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
0	150	0	0	0	0	0

---

Rossi Count:

Absentee Scanner 2 (Tabulator 05160), Batch 19

Trump	Biden	Jorgensen	Other
10	87	1	1

Absentee Scanner 2 (Tabulator 05160), Batch 20

Trump	Biden	Jorgensen	Other
25	74	1	0

Absentee Scanner 2 (Tabulator 05160), Batch 21

Trump	Biden	Jorgensen	Other
8	97	1	0

---

*Internal Count provided on next page.*

Internal Count:

Absentee Scanner 2 (Tabulator 05160), Batch 19

Trump	Biden	Jorgensen	Other
10	87	2	0

Absentee Scanner 2 (Tabulator 05160), Batch 20

Trump	Biden	Jorgensen	Other
25	74	1	0

Absentee Scanner 2 (Tabulator 05160), Batch 21

Trump	Biden	Jorgensen	Other
8	97	1	0

**INCONSISTENCY 5: BATCH ENTRY REFLECTING 100% VOTE COUNT FOR ONE CANDIDATE**

The batch entry on Row 19153, identified as “AbsenteeScanner2Batch22,” reports all 200 votes for Biden.

**The Ballot Images corresponding to Batch 22 of Absentee Scanner 2 (Tabulator 05160) do not reflect a unanimous vote count for one candidate.**

Detailed Audit Report: Row 19153: AbsenteeScanner2Batch22

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
0	200	0	0	0	0	0

---

Rossi Count: Absentee Scanner 2 (Tabulator 05160), Batch 22

Trump	Biden	Jorgensen	Other
12	85	3	0

---

Internal Count: Absentee Scanner 2 (Tabulator 05160), Batch 22

Trump	Biden	Jorgensen	Other
12	85	2	1

**INCONSISTENCY 6: MISIDENTIFIED BATCH ENTRY**

The batch entry on Row 19165 is identified as "AbsenteeScanner2Batch237." The batch entry on Row 20308 is identified as "scanner2/237." Each of these entries report different vote counts. **One of these entries appears to be misidentified.**

Detailed Audit Report:

Row 19165: AbsenteeScanner2Batch237

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
25	74	0	0	0	0	0

Row 20308: scanner2/237

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
3	95	0	0	1	1	2

---

Rossi Count: Absentee Scanner 2 (Tabulator 05160), Batch 237

Trump	Biden	Jorgensen	Other
4	93	2	0

---

Internal Count: Absentee Scanner 2 (Tabulator 05160), Batch 237

Trump	Biden	Jorgensen	Other
4	93	2	0

**INCONSISTENCY 7: DUPLICATED BATCH ENTRY**

The batch entry on Row 19166, identified as "AbsenteeScanner2Batch238," reports an identical vote count as the batch entry on Row 19587, identified as "AbsenteeScanner3Batch238." One of these entries appears to be duplicated.

Detailed Audit Report:

Row 19166: AbsenteeScanner2Batch238

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
22	59	0	0	0	0	0

Row 19587: AbsenteeScanner3Batch238

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
22	59	0	0	0	0	0

---

Rossi Count:

Absentee Scanner 2 (Tabulator 05160), Batch 238

Trump	Biden	Jorgensen	Other
25	74	0	0

Absentee Scanner 3 (Tabulator 05162), Batch 238

- No count was provided by Mr. Rossi.

---

Internal Count:

Absentee Scanner 2 (Tabulator 05160), Batch 238

Trump	Biden	Jorgensen	Other
25	74	0	0

Absentee Scanner 3 (Tabulator 05162), Batch 238

Trump	Biden	Jorgensen	Other
23	57	1	0

**INCONSISTENCY 8: MISIDENTIFIED BATCH ENTRY**

The batch entry on Row 19167 is identified as "AbsenteeScanner2Batch240." The batch entry on Row 19168 is identified as "AbsenteeScanner2Batch 240." Each of these entries report different vote counts. **One of these entries appears to be misidentified.**

Detailed Audit Report:

Row 19167: AbsenteeScanner2Batch240

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
10	90	0	0	0	0	0

Row 19168: AbsenteeScanner2Batch 240

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
31	62	1	0	0	0	0

---

Rossi Count: Absentee Scanner 2 (Tabulator 05160), Batch 240

Trump	Biden	Jorgensen	Other
31	62	1	2

---

Internal Count: Absentee Scanner 2 (Tabulator 05160), Batch 240

Trump	Biden	Jorgensen	Other
31	62	1	2



**INCONSISTENCY 9: MISIDENTIFIED BATCH ENTRY**

The batch entry on Row 19169 is identified as "AbsenteeScanner2Batch241." The batch entry on Row 19170 is identified as "AbsenteeScanner2Batch 241." Each of these entries report different vote counts. **One of these entries appears to be misidentified.**

Detailed Audit Report:

Row 19169: AbsenteeScanner2Batch241

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
34	63	0	0	0	1	0

Row 19170: AbsenteeScanner2Batch 241

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
11	88	1	0	0	0	0

---

Rossi Count: Absentee Scanner 2 (Tabulator 05160), Batch 241

Trump	Biden	Jorgensen	Other
11	88	1	2

---

Internal Count: Absentee Scanner 2 (Tabulator 05160), Batch 241

Trump	Biden	Jorgensen	Other
11	88	1	2

**INCONSISTENCY 10: DUPLICATED BATCH ENTRIES**

The vote count reported by the batch entry on Row 19172, identified as “AbsenteeScanner2Batch243,” does not match the vote count of the corresponding Ballot Images. The vote count reported by the batch entry on Row 19174, identified as “AbsenteeScanner2Batch244-249” (which appears to report the vote counts of six separate batches), also does not match the vote count of the corresponding Ballot Images.

However, when the corresponding Ballot Images of Row 19172 are considered in addition to the corresponding Ballot Images of Row 19174, the aggregate vote count of the Ballot Images matches the vote count reported by Row 19174 in the Detailed Audit Report. **Accordingly, Row 19172 appears to be misidentified.**

Additionally, Row 19173, identified as “AbsenteeScanner2batch244-249,” nearly matches the same vote count reported by the batch entry on Row 19174. **The entry appears to be duplicated.** Of note, Row 19173 reports “Election Day” ballots, as opposed to “Absentee By Mail” ballots.

Detailed Audit Report:

Row 19172: AbsenteeScanner2Batch243

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
7	90	1	0	0	1	0

Row 19173: AbsenteeScanner2batch244-249

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
110	556	7	0	0	2	1

Row 19174: AbsenteeScanner2Batch244-249

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
110	556	7	0	3	2	1

Rossi Count: Absentee Scanner 2 (Tabulator 05160), Batches 244-249

Trump	Biden	Jorgensen	Other
110	564	7	8

Internal Count: Absentee Scanner 2 (Tabulator 05160), Batches 243 and 244-249

Batch	Trump	Biden	Jorgensen	Other
<b>243</b>	<b>21</b>	<b>73</b>	<b>2</b>	<b>2</b>
244	9	88	1	1
245	21	79	0	0
246	4	93	1	0
247	9	93	0	1
248	34	60	1	2
249	12	80	2	0
Totals	110	566	7	6

Agreed  
MRM  
duplicates  
CGG

**INCONSISTENCY 11: MISIDENTIFIED AND DUPLICATED BATCH ENTRY**

The batch entry on Row 19219 is identified as “AbsenteeScanner2Batch297.” The batch entry on Row 19220 is identified as “AbsenteeScanner2Batch 297.” Each of these entries report different vote counts. **One of these entries appears to be misidentified.**

Additionally, Row 18951, identified as “AbsenteeScanner1Batch297,” reflects an identical vote count as Row 19219. **One of these entries appears to be duplicated.**

Detailed Audit Report:

Row 19219: AbsenteeScanner2Batch297

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
42	56	1	0	0	0	0

Row 19220: AbsenteeScanner2Batch 297

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
27	71	0	0	0	0	0

Row 18951: AbsenteeScanner1Batch297

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
42	56	1	0	0	0	0

Rossi Count:

Absentee Scanner 2 (Tabulator 05160), Batch 297

- Count not provided by Mr. Rossi.

Absentee Scanner 1 (Tabulator 05150), Batch 297

Trump	Biden	Jorgensen	Other
42	56	1	0

Internal Count:

Absentee Scanner 2 (Tabulator 05160), Batch 297

Trump	Biden	Jorgensen	Other
27	71	1	0

Absentee Scanner 1 (Tabulator 05150), Batch 297

Trump	Biden	Jorgensen	Other
42	56	1	1

MRM  
Agreed duplicate  
CGG

**INCONSISTENCY 12: MISIDENTIFIED BATCH ENTRY**

The batch entry on Row 19323 is identified as “AbsenteeScanner2Batch400.” The batch entry on 20252 is identified as “sc 2- 400.” Each of these entries report different vote counts. **One of these entries appears to be misidentified.**

Detailed Audit Report:

Row 19323: AbsenteeScanner2Batch400

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
6	92	0	0	0	0	0

Row 20252: sc 2- 400

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
36	60	1	0	0	3	0

---

Rossi Count: Absentee Scanner 2 (Tabulator 05160), Batch 400

Trump	Biden	Jorgensen	Other
36	60	0	0

---

Internal Count: Absentee Scanner 2 (Tabulator 05160), Batch 400

Trump	Biden	Jorgensen	Other
36	60	1	3

**INCONSISTENCY 13: DUPLICATED BATCH ENTRY**

The batch entry on Row 19482, identified as "AbsenteeScanner3Batch1," reports an identical vote count as the batch entry on Row 20317, identified as "Scanner 3/1." **One of these entries appears to be duplicated.**

Detailed Audit Report:

Row 19482: AbsenteeScanner3Batch1

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
42	55	2	0	0	0	1

Row 20317: Scanner 3/1

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
42	55	2	0	0	0	1

---

Rossi Count: Absentee Scanner 3 (Tabulator 05162), Batch 1

Trump	Biden	Jorgensen	Other
44	55	2	0

---

*Internal Count provided on the next page.*

Internal Count: Absentee Scanner 3 (Tabulator 05162), Batch 1

Trump	Biden	Jorgensen	Other
44	55	2	0

**INCONSISTENCY 14: MISIDENTIFIED BATCH ENTRY**

The batch entry on Row 19524 is identified as “Absentee Scanner 3 Batch 158.” The batch entry on Row 20332 is identified as “scanner 3 /158.” Each of these entries report different vote counts. **One of these entries appears to be misidentified.**

Detailed Audit Report:

Row 19524: Absentee Scanner 3 Batch 158

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
30	68	1	0	0	1	0

Row 20332: scanner 3 /158

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
3	99	0	0	0	0	0

---

Rossi Count: Absentee Scanner 3 (Tabulator 05162), Batch 158

Trump	Biden	Jorgensen	Other
30	68	2	0

---

Internal Count: Absentee Scanner 3 (Tabulator 05162), Batch 158

Trump	Biden	Jorgensen	Other
30	68	1	1

**INCONSISTENCY 15: DUPLICATED BATCH ENTRIES**

The batch entry on Row 19535, identified as “AbsenteeScanner3Batch174- 178,” reports an identical vote count as the batch entry on Row 19537, identified as “AbsenteeScanner3BatchBatch 177.” The batch entry on Row 19536, identified as “AbsenteeScanner3Batch175-176,” nearly matches the vote counts reported in Row 19535 and Row 19537 with the lone exception being that Row 19536 reports two additional blank/undervotes. **One or more of these entries appears to be duplicated.**

Detailed Audit Report:

Row 19535: AbsenteeScanner3Batch174- 178

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
96	392	0	0	0	0	0

Row 19536: AbsenteeScanner3Batch175-176

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
96	392	0	0	0	2	0

Row 19537: AbsenteeScanner3Batch177

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
96	392	0	0	0	0	0

---

Rossi Count:

Absentee Scanner 3 (Tabulator 05162) Batches 174-178

Trump	Biden	Jorgensen	Other
96	392	6	1

Absentee Scanner 3 (Tabulator 05162), Batches 175-176

Trump	Biden	Jorgensen	Other
57	137	1	0

Absentee Scanner 3 (Tabulator 05162), Batch 177

Trump	Biden	Jorgensen	Other
9	89	1	0

---

Internal Count: Absentee Scanner 3 (Tabulator 05162), Batches 174-178

Batch	Trump	Biden	Jorgensen	Other
174	22	75	1	1
175	26	67	0	1
176	31	70	0	0
177	9	89	0	1
178	8	91	2	1
Totals	96	392	3	4

**INCONSISTENCY 16: DUPLICATED BATCH ENTRY**

The batch entry on Row 19538, identified as “AbsenteeScanner3Batch18,” reports an identical vote count as the batch entry on Row 20336, identified as “scanner 3/18.” **One of these entries appears to be duplicated.**

Detailed Audit Report:

Row 19538: AbsenteeScanner3Batch18

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
1	79	0	0	0	0	0

Row 20336: scanner 3/18

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
1	79	0	0	0	0	0

---

Rossi Count: Absentee Scanner 3 (Tabulator 05162), Batch 18

Trump	Biden	Jorgensen	Other
2	78	0	0

---

Internal Count: Absentee Scanner 3 (Tabulator 05162), Batch 18

Trump	Biden	Jorgensen	Other
2	77	0	1



**INCONSISTENCY 17: DUPLICATED BATCH ENTRY**

The batch entry on Row 19560, identified as "AbsenteeScanner3Batch21," reports an identical vote count as the batch entry on Row 20344, identified as "scanner 3/21." **One of these entries appears to be duplicated.**

Detailed Audit Report:

Row 19560: AbsenteeScanner3Batch21

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
24	74	0	0	0	0	0

Row 20344: scanner 3/21

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
24	74	0	0	0	0	0

---

Rossi Count: Absentee Scanner 3 (Tabulator 05162), Batch 21

Trump	Biden	Jorgensen	Other
25	75	0	2

---

Internal Count: Absentee Scanner 3 (Tabulator 05162), Batch 21

Trump	Biden	Jorgensen	Other
25	73	0	2

**INCONSISTENCY 18: DUPLICATED BATCH ENTRY**

The batch entry on Row 19563, identified as “AbsenteeScanner3Batch212,” reports an identical vote count as the batch entry on Row 20345, identified as “SCANNER- 3/212.” **One of these entries appears to be duplicated.**

Detailed Audit Report:

Row 19563: AbsenteeScanner3Batch212

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
11	86	1	0	0	0	0

Row 20345: SCANNER- 3/212

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
11	86	1	0	0	0	0

---

Rossi Count: Absentee Scanner 3 (Tabulator 05162), Batch 212

Trump	Biden	Jorgensen	Other
11	86	1	1

---

Internal Count: Absentee Scanner 3 (Tabulator 05162), Batch 212

Trump	Biden	Jorgensen	Other
11	86	1	1

**INCONSISTENCY 19: DUPLICATED BATCH ENTRY**

The batch entry on Row 19589, identified as “AbsenteeScanner3Batch24,” reports an identical vote count as the batch entry on Row 20349, identified as “scanner 3/24.” **One of these entries appears to be duplicated.**

Detailed Audit Report:

Row 19589: AbsenteeScanner3Batch24

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
5	92	0	0	0	0	0

Row 20349: scanner 3/24

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
5	92	0	0	0	0	0

---

Rossi Count: Absentee Scanner 3 (Tabulator 05162), Batch 24

Trump	Biden	Jorgensen	Other
5	92	0	0

---

Internal Count: Absentee Scanner 3 (Tabulator 05162), Batch 24

Trump	Biden	Jorgensen	Other
5	92	0	0

**INCONSISTENCY 20: MISIDENTIFIED BATCH ENTRY**

The batch entry on Row 19625 is identified as "AbsenteeScanner3Batch3." The batch entry on Row 19626 is identified as "AbsenteeScanner3 Batch3." Each of these entries report different vote counts. **One of these entries appears to be misidentified.**

Detailed Audit Report:

Row 19625: AbsenteeScanner3Batch3

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
2	85	2	0	0	0	0

Row 19626: AbsenteeScanner3 Batch3

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
24	56	1	0	0	1	0

---

Rossi Count: Absentee Scanner 3 (Tabulator 05162), Batch 3

Trump	Biden	Jorgensen	Other
4	84	2	0

---

Internal Count: Absentee Scanner 3 (Tabulator 05162), Batch 3

Trump	Biden	Jorgensen	Other
3	84	2	1

**INCONSISTENCY 21: MISIDENTIFIED OR DUPLICATED BATCH ENTRY**

The batch entry on Row 19647 is identified as "AbsenteeScanner3Batch 320." The batch entry on Row 20353 is identified as "scanner 3/320." Though the entries report different vote counts, the difference is slight with Row 19647 reporting five additional votes for Trump and five less votes for Biden. **One of these entries appears to be misidentified or duplicated.**

Detailed Audit Report:

Row 19647: AbsenteeScanner3Batch 320

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
35	64	0	0	0	0	0

Row 20353: scanner 3/320

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
30	69	0	0	0	0	0

---

Rossi Count: Absentee Scanner 3 (Tabulator 05162), Batch 320

Trump	Biden	Jorgensen	Other
30	70	0	0

---

Internal Count: Absentee Scanner 3 (Tabulator 05162), Batch 320

Trump	Biden	Jorgensen	Other
30	70	0	0

**INCONSISTENCY 22: MISIDENTIFIED BATCH ENTRIES**

The batch entry on Row 19659, identified as "AbsenteeScanner3Batch339-346," appears to report the vote counts of eight separate batches. The batch entry on Row 20264 is identified as "sc 3 (339)," a batch that would appear to be included in the vote count of Row 19659. The batch entry on Row 20265 is identified as "sc 3 (340)," a batch that would appear to be included in the vote count of Row 19659.

**When considering the corresponding Ballot Images, Row 20264 and Row 20265 appear to be misidentified.**

Detailed Audit Report:

Row 19659: AbsenteeScanner3Batch339-346

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
143	625	10	0	0	3	0

Row 20264: sc 3 (339)

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
76	214	6	0	0	1	0

Row 20265: sc 3 (340)

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
6	72	1	0	0	2	0

---

Rossi Count:

Absentee Scanner 3 (Tabulator 05162), Batches 339-346

Trump	Biden	Jorgensen	Other
146	619	10	0

Absentee Scanner 3 (Tabulator 05162), Batch 339

Trump	Biden	Jorgensen	Other
34	64	1	0

Absentee Scanner 3 (Tabulator 05162), Batch 340

Trump	Biden	Jorgensen	Other
4	95	0	0

---

*Internal Count provided on next page.*

Internal Count: Absentee Scanner 3 (Tabulator 05162), Batches 339-346

Batch	Trump	Biden	Jorgensen	Other
<b>339</b>	<b>34</b>	<b>64</b>	<b>1</b>	<b>1</b>
<b>340</b>	<b>4</b>	<b>96</b>	<b>0</b>	<b>0</b>
341	5	94	1	0
342	19	82	0	0
343	6	69	2	2
344	45	54	1	2
345	16	79	4	1
346	16	83	1	0
Totals	145	621	10	6

**INCONSISTENCY 23: DUPLICATED BATCH ENTRY**

The batch entry on Row 19676, identified as "AbsenteeScanner3Batch 368," nearly matches the same vote count reported by the batch entry on Row 19677, identified as "Absentee Scanner 3 Batch 368." The lone exception being that Row 19677 reports an additional vote for Jorgensen. **One of these entries appears to be duplicated.**

Detailed Audit Report:

Row 19676: AbsenteeScanner3Batch 368

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
4	93	0	0	1	0	0

Row 19677: Absentee Scanner 3 Batch 368

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
4	93	1	0	1	0	0

---

Rossi Count: Absentee Scanner 3 (Tabulator 05162), Batch 368

Trump	Biden	Jorgensen	Other
4	93	0	1

---

Internal Count: Absentee Scanner 3 (Tabulator 05162), Batch 368

Trump	Biden	Jorgensen	Other
3	92	0	3



**INCONSISTENCY 24: MISIDENTIFIED BATCH ENTRY OR DUPLICATED BATCH ENTRY**

The batch entry on Row 19678 is identified as "AbsenteeScanner3Batch369." The batch entry on Row 19679 is identified as "Absentee Scanner 3 Batch 369." Though the entries report different vote counts, the difference is slight with Row 19678 reporting four additional votes for Trump and Row 19679 reporting one additional vote for Jorgensen. **One of these entries appears to be misidentified or duplicated.**

Detailed Audit Report:

Row 19678: AbsenteeScanner3Batch369

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
12	88	0	0	0	0	0

Row 19679: Absentee Scanner 3 Batch 369

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
8	88	1	0	0	0	0

---

Rossi Count: Absentee Scanner 3 (Tabulator 05162), Batch 369

Trump	Biden	Jorgensen	Other
8	88	1	0

---

Internal Count: Absentee Scanner 3 (Tabulator 05162), Batch 369

Trump	Biden	Jorgensen	Other
8	88	0	2

**INCONSISTENCY 25: MISIDENTIFIED BATCH ENTRY AND MISALLOCATION OF VOTES**

The batch entry on Row 19744 is identified as "AbsenteeScanner3Batch89." The batch entry on Row 19745 is identified as "Absentee Scanner 3 Batch 89." Each of these entries report different vote counts. **One of these entries appears to be misidentified.**

Additionally, the batch entry on Row 19745 reports 76 votes for Trump, 22 votes for Biden, 1 vote for Jorgensen, and 2 overvotes. The Ballot Images corresponding to Batch 89 of Absentee Scanner 3 (Tabulator 05162) show 22 votes for Trump, 76 votes for Biden, 1 vote for Jorgensen, and 2 other votes. **It appears that the votes for Trump and Biden were misallocated.**

Detailed Audit Report:

Row 19744: AbsenteeScanner3Batch89

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
27	71	2	0	0	0	0

Row 19745: Absentee Scanner 3 Batch 89

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
76	22	1	0	0	0	2

---

Rossi Count: Absentee Scanner 3 (Tabulator 05162), Batch 89

Trump	Biden	Jorgensen	Other
22	76	1	2

---

Internal Count: Absentee Scanner 3 (Tabulator 05162), Batch 89

Trump	Biden	Jorgensen	Other
22	76	1	2

**INCONSISTENCY 26: MISIDENTIFIED BATCH ENTRY**

The batch entry on Row 19748, identified as “Absentee Scanner 3 Batch 91-97,” appears to report the vote counts of seven separate batches. The batch entry on Row 19747 is identified as “AbsenteeScanner3Batch91,” a batch that would appear to be included in the vote count of Row 19748.

**When considering the corresponding Ballot Images, Row 19747 appears to be misidentified.**

Detailed Audit Report:

Row 19748: Absentee Scanner 3 Batch 91-97

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
128	558	6	0	0	1	0

Row 19747: AbsenteeScanner3Batch91

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
2	98	1	0	0	1	0

---

Rossi Count: Absentee Scanner 3 (Tabulator 01562), Batches 91-97

Trump	Biden	Jorgensen	Other
128	561	6	1

---

Internal Count: Absentee Scanner 3 (Tabulator 01562), Batches 91-97

Batch	Trump	Biden	Jorgensen	Other
<b>91</b>	<b>28</b>	<b>70</b>	<b>2</b>	<b>0</b>
92	2	97	2	0
93	5	90	2	0
94	36	64	0	0
95	3	96	0	0
96	24	77	0	1
97	30	66	2	3
Totals	128	560	6	4

**INCONSISTENCY 27: BATCH ENTRY REFLECTING 100% VOTE COUNT FOR ONE CANDIDATE**

The batch entry on Row 19810, identified as "AbsenteeScanner4Batch36," reports all 100 votes for Biden. The batch entry on Row 19811, identified as "AbsenteeScanner4Batch37," reports all 100 votes for Biden.

**The Ballot Images corresponding to Batches 36 and 37 of Absentee Scanner 4 (Tabulator 05164) do not reflect unanimous vote counts for one candidate.**

Detailed Audit Report:

Row 19810: AbsenteeScanner4Batch36

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
0	100	0	0	0	0	0

Row 19811: AbsenteeScanner4Batch37

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
0	100	0	0	0	0	0

---

Rossi Count:

Absentee Scanner 4 (Tabulator 05164), Batch 36

Trump	Biden	Jorgensen	Other
23	78	4	0

Absentee Scanner 4 (Tabulator 05164), Batch 37

Trump	Biden	Jorgensen	Other
40	60	0	0

---

Internal Count:

Absentee Scanner 4 (Tabulator 05164), Batch 36

Trump	Biden	Jorgensen	Other
23	78	2	2

Absentee Scanner 4 (Tabulator 05164), Batch 37

Trump	Biden	Jorgensen	Other
40	60	0	0

**INCONSISTENCY 28: DUPLICATED BATCH ENTRY**

The batch entry on Row 19814, identified as “AbsenteeScanner4Batch40,” reports an identical vote count as the batch entry on Row 19815, identified as “AbsenteeScanner 4Batch40.” **One of these entries appears to be duplicated.**

Detailed Audit Report:

Row 19814: AbsenteeScanner4Batch40

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
2	95	0	0	0	0	0

Row 19815: AbsenteeScanner 4Batch40

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
2	95	0	0	0	0	0

---

Rossi Count:

- No count was provided by Mr. Rossi.

---

Internal Count: Absentee Scanner (Tabulator 05164), Batch 40

Trump	Biden	Jorgensen	Other
2	97	0	0

**INCONSISTENCY 29: MISIDENTIFIED AND DUPLICATED BATCH ENTRY**

The batch entry on Row 19862, identified as “AbsenteeScanner4Batch99-108,” appears to report the vote counts of ten separate batches. The batch entry on Row 19753 is identified as “AbsenteeScanner4Batch 107,” a batch that would appear to be included in the vote count of Row 19862.

**When considering the corresponding Ballot Images, Row 19747 appears to be misidentified.**

Additionally, the batch entry on Row 19862 reports an identical vote count as the batch entry on Row 20006, identified as “Etris Community Ctr.” **Despite the distinct identifications, one of the entries appears to be duplicated.**

Of note, the batch type of Row 20006 is also identified as “Advance” ballots as opposed to “Absentee By Mail” ballots. **These ballots could not be reviewed as only Absentee By Mail ballot images were provided in the related open records request.**

MRM  
Agree that it is  
dupe.  
CGG

Detailed Audit Report:

Row 19862: AbsenteeScanner4Batch99-108

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
166	745	12	0	0	15	0

Row 19753: AbsenteeScanner4Batch107

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
8	90	1	0	0	0	0

Row 20006: Etris Community Ctr.

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
166	745	12	0	0	15	0

---

Rossi Count: Absentee Scanner 4 (Tabulator 05164), Batches 99-108

Trump	Biden	Jorgensen	Other
166	747	22	7

---

*Internal Count provided on next page.*

Internal Count: Absentee Scanner 4 (Tabulator 05164), Batches 99-108

Batch	Trump	Biden	Jorgensen	Other
99	16	74	3	4
100	9	84	2	2
101	43	51	3	0
102	17	75	3	2
103	43	52	1	0
104	12	83	2	2
105	8	87	2	1
106	7	67	2	0
<b>107</b>	<b>3</b>	<b>93</b>	<b>3</b>	<b>0</b>
108	8	81	1	2
Totals	166	747	22	13

**INCONSISTENCY 30: MISIDENTIFIED OR DUPLICATED BATCH ENTRY**

The batch entry on Row 19873, identified as “AbsenteeScanner5Batch15-20,21,24.25,” appears to report the vote counts of nine separate batches. The batch entry on Row 19874 is identified as “AbsenteeScanner5Batch17 -Military.” **Row 19874 appears to be misidentified or a duplicated report of the vote count reported in Row 19873.**

Detailed Audit Report:

Row 19873: AbsenteeScanner5Batch15-20,21,24.25

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
149	752	14	0	4	2	1

Row 19874: AbsenteeScanner5Batch17-Military

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
7	17	0	0	0	0	0

---

Rossi Count:

- No count was provided by Mr. Rossi.
- 

Internal Count: Absentee Scanner 5 (Tabulator 00729), Batches 15-20, 21, 24, 25

Batch	Trump	Biden	Jorgensen	Other
15	27	72	2	0
16	5	93	0	1
<b>17</b>	<b>11</b>	<b>85</b>	<b>3</b>	<b>0</b>
18	23	73	2	1
19	28	64	4	3
20	28	71	0	1
21	5	105	0	0
24	21	76	0	1
25	23	92	4	0
Totals	171	731	15	7



**INCONSISTENCY 31: BATCH ENTRIES REFLECTING 100% VOTE COUNTS FOR ONE CANDIDATE**

The batch entry on Row 19875, identified as “AbsenteeScanner5Batch1 – Military,” reports all 950 votes for Biden. The batch entry on Row 19879, identified as “AbsenteeScanner5Batch2-Military,” reports all 130 votes for Trump.

**The Ballot Images corresponding to Batches 1 and 2 of Absentee Scanner 5 (Tabulator 00729) do not reflect unanimous vote counts for one candidate.**

Row 19875: AbsenteeScanner5Batch1 – Military

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
0	950	0	0	0	0	0

Row 19876: AbsenteeScanner5Batch2-Military

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
130	0	0	0	0	0	0

---

Rossi Count:

Absentee Scanner 5 (Tabulator 00729), Batch 1

Trump	Biden	Jorgensen	Other
6	92	2	0

Absentee Scanner 5 (Tabulator 00729), Batch 2

Trump	Biden	Jorgensen	Other
5	94	0	1

---

Internal Count:

Absentee Scanner 5 (Tabulator 00729), Batch 1

Trump	Biden	Jorgensen	Other
6	92	1	1

Absentee Scanner 5 (Tabulator 00729), Batch 2

Trump	Biden	Jorgensen	Other
5	94	0	1

**INCONSISTENCY 32: MISIDENTIFIED BATCH ENTRIES AND DUPLICATED BATCH ENTRIES**

The batch entry on Row 20385, identified as “scanner 5/55-67-71-75,” appears to report the vote counts of 4 separate batches. The batch entry on Row 19895 is identified as “AbsenteeScanner5Batch55,” a batch that would appear to be included in the vote count of Row 20385. The batch entry on Row 19902 is identified as “AbsenteeScanner5Batch67,” a batch that would appear to be included in the vote count of Row 20385.

**When considering the corresponding Ballot Images, Row 19895 appears to be duplicated (as its vote count was included in the vote count of Row 20385) and Row 19902 appears to be misidentified.**

Detailed Audit Report:

Row 20385: scanner 5/55-67-71-75

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
74	217	2	3	0	2	0

Row 19895: AbsenteeScanner5Batch55

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
10	72	2	0	0	0	0

Row 19902: AbsenteeScanner5Batch67

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
2	94	1	0	0	0	0

---

Rossi Count:

Absentee Scanner 5 (Tabulator 00729), Batches 55, 67, 71, 55

Trump	Biden	Jorgensen	Other
97	277	5	6

Absentee Scanner 5 (Tabulator 00729), Batch 55

Trump	Biden	Jorgensen	Other
10	73	2	1

Absentee Scanner 5 (Tabulator 00729), Batch 67

Trump	Biden	Jorgensen	Other
18	77	1	3

---

Internal Count: Absentee Scanner 5 (Tabulator 00729), Batches 55, 67, 71, 75

Batch	Trump	Biden	Jorgensen	Other
<b>55</b>	<b>10</b>	<b>73</b>	<b>2</b>	<b>1</b>
<b>67</b>	<b>18</b>	<b>77</b>	<b>1</b>	<b>3</b>
71	28	70	1	1
75	41	57	1	1
Totals	71	277	5	6

**INCONSISTENCY 33: MISIDENTIFIED BATCH ENTRY**

The batch entry on Row 19909 is identified as "AbsenteeScanner5Batch92." The batch entry on Row 19910 is identified as "AbsenteeScanner5Batch92Military." Each of these entries reports different vote counts. **One of these entries appears to be misidentified.**

**Additionally, the Ballot Images corresponding to Batch 92 of Absentee Scanner 5 (Tabulator 00729) do not correlate to the vote counts reported by Row 19909 or Row 19910.**

Detailed Audit Report:

Row 19909: AbsenteeScanner5Batch92

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
45	46	1	0	0	0	0

Row 19910: AbsenteeScanner5Batch92Military

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
37	178	2	0	0	0	0

---

Rossi Count: Absentee Scanner 5 (Tabulator 00729), Batch 92

Trump	Biden	Jorgensen	Other
23	92	2	0

---

Internal Count: Absentee Scanner 5 (Tabulator 00729), Batch 92

Trump	Biden	Jorgensen	Other
23	92	2	0

**INCONSISTENCY 34: MISIDENTIFIED AND DUPLICATED BATCH ENTRY**

The batch entry on Row 19911, identified as “AbsenteeScanner5Batch95,” reports an identical vote count as the batch entry on Row 20397, identified as “scanner 5/94.” **Despite the distinct identifications, one of the entries appears to be duplicated.**

Additionally, the Ballot Images corresponding to Batches 94 and 95 of Absentee Scanner 5 (Tabulator 00729) do not correlate to the vote counts reported by Row 19911 and 20397. **These entries also appear to be misidentified.**

Detailed Audit Report:

Row 19911: AbsenteeScanner5Batch95

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
19	102	1	0	0	1	0

Row 20397: scanner 5/94

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
19	102	1	0	0	1	0

---

Rossi Count:

Absentee Scanner 5 (Tabulator 00729), Batch 95

Trump	Biden	Jorgensen	Other
27	42	3	1

Absentee Scanner 5 (Tabulator 00729), Batch 94

Trump	Biden	Jorgensen	Other
16	60	0	0

---

Internal Count:

Absentee Scanner 5 (Tabulator 00729), Batch 95

Trump	Biden	Jorgensen	Other
27	42	3	1

Absentee Scanner 5 (Tabulator 00729), Batch 94

Trump	Biden	Jorgensen	Other
16	60	1	1

**INCONSISTENCY 35: MISIDENTIFIED BATCH ENTRY**

The batch entry on Row 20277 is identified as “SCAN 1-97.” The batch entry on Row 20303 is identified as “scanner 1/97.” Each of these entries report different vote counts. Additionally, the Ballot Images corresponding to Batch 97 of Absentee Scanner 1 do not correlate to either Row 20277 or Row 20303. **These entries appear to be misidentified.**

Detailed Audit Report:

Row 20277: SCAN 1-97

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
31	74	3	0	0	0	0

Row 20303: scanner 1/97

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
43	45	1	0	0	0	0

---

Rossi Count: Absentee Scanner 1 (Tabulator 05150), Batch 97

Trump	Biden	Jorgensen	Other
41	55	1	0

---

Internal Count: Absentee Scanner 1 (Tabulator 05150), Batch 97

Trump	Biden	Jorgensen	Other
41	55	1	0

**INCONSISTENCY 36: APPARENT MISALLOCATION OF VOTES**

The batch entry on Row 20361, identified as “scanner 3/66,” reports zero votes for Trump, 77 votes for Biden, 23 votes for Jorgensen, and zero other votes. The Ballot Images corresponding to Batch 66 of Absentee Scanner 3 (Tabulator 05162) show 23 votes for Trump, 77 votes for Biden, and zero other votes. **It appears that 23 votes in Row 20361 were misallocated from Trump to Jorgensen.**

Detailed Audit Report:

Row 20361: scanner 3/66

Trump	Biden	Jorgensen	I W/I	V W/I	B/U	O
0	77	23	0	0	0	0

---

Rossi Count: Absentee Scanner 3 (Tabulator 05162), Batch 66

Trump	Biden	Jorgensen	Other
23	77	0	0

---

Internal Count: Absentee Scanner 3 (Tabulator (05162), Batch 66

Trump	Biden	Jorgensen	Other
23	77	0	0

# **APPENDIX 5**

## DECLARATION OF MARILYN MARKS

MARILYN MARKS hereby declares under penalty of perjury, pursuant to 28 U.S.C. (s) 1746, that the following is true and correct:

1. My name is Marilyn Marks
2. I am the Executive Director of Coalition for Good Governance (“Coalition”).
3. I have personal knowledge of all facts stated in this declaration, and if called to testify, I would testify competently thereto.
4. On approximately December 8, 2021 Fulton County Board of Registration and Elections produced to counsel for Coalition for Good Governance a usb device containing electronic election records from the November 3, 2020 election and presidential recount. These records were produced in response to this Court’s order. (Doc. 1239).
5. Shortly thereafter, I took possession of the original usb device to prepare copies for Coalition Plaintiffs’ experts. I did not alter the files. The original usb device was in my sole possession from approximately December 10, 2021 until March 2, 2022 when I transmitted them to Dr. Philip Stark.
6. On March 2, 2022 I sent the referenced original usb device containing unaltered files as I had received them to Dr. Philip Stark by overnight delivery.



Executed this 9<sup>st</sup> day of March, 2022



---

Marilyn Marks

# **APPENDIX 6**

```
In [1]: import numpy as np
import pandas as pd
from PIL import Image, ImageDraw, ImageFont, ImageSequence, ImageColor
from PyPDF2 import PdfFileMerger, PdfFileReader
import os, sys, re, itertools, contextlib, json
from collections import defaultdict
import cv2
import time
from cryptorandom import cryptorandom as cr
from cryptorandom.sample import random_sample
from permute.utils import hypergeom_conf_interval
```

```
In [2]: # image display settings
FONT = ImageFont.truetype("Keyboard.ttf",40) # for displaying filenames on ballot images
FILL = 'red'
PAUSE_FREQ = 25 # pause display after showing this many images
CLEANUP = True # remove stale results before starting
```

```
In [3]: # where stuff sits
mc1_img_path = './Data/Fulton Nov 03 Original/Results/' # path for original
mc2_img_path = './Data/Nov 03 2020 recount/Results/' # path for 2nd machine count

save_stem = './Img/' # start of path for saving results
```

## Functions

```
In [4]: # unpack image identifiers into full path and filenames
def unpacklink(img_name : str, path : str=mc1_img_path, prefix : list=['Tabulator', 'Batch', 'Images'], suffix
    parts = img_name.split('_')
    return f'{path}{prefix[0]}{int(parts[0]) :05d}/{prefix[1]}{int(parts[1]) :03d}/{prefix[2]}/{img_name}{suffi
```

```
In [5]: def abutImages(imgs, names=None, show=True, save=False, prefix='', path='', extension='.pdf', origin : tuple=(1
    font=FONT, fill=FILL):
    '''
    display ballot images next to each other

    Parameters
```

```

-----
imgs : array of PIL.Image
      the images
save : Boolean
      safe the composite?
names : tuple
      identifiers to print on each collection of sheets
path : str
      path to save images
extension : str
      extension for image file; determines image format
...

stack = []
i=0
for row in zip(*[ImageSequence.Iterator(im) for im in imgs]):
    tot_width = 0
    for r in row:
        tot_width += r.width
    abut = Image.new('RGB', (tot_width, row[0].height))
    offset = 0
    for k, r in enumerate(row):
        r = r.convert("RGBA")
        draw = ImageDraw.Draw(r)
        if names:
            draw.text(origin, f'{names[k]}', font=font, fill=fill, direction='ttb')
            abut.paste(r, (offset, 0))
            offset += r.width
    stack.append(abut)
    if show:
        abut.show()
    if save:
        name = '-'.join(names) if names else 'img'
        abut.save(f'{path+prefix+name}_{i}{extension}')
    i+=1
return stack

```

```

In [6]: def flipThruSets(sets : list, notes : str='', pause_frequency : int=25, stop_at : int=None, \
          skip : int=0, path='./', show=True, save=True):

```

```

...
display sets of ballot images side-by-side with annotation for filenames

```

```

Parameters

```

```

-----

```

```

sets : list
    list of image filename replicates
notes : string
    note to add to annotation
pause_frequency : int >= 0
    how many images to display before pausing
stop_at : int
    limit on how many images to display
skip : int
    skip this many images
origin : tuple of ints (two)
    origin point on image at which to add the annotation
font : ImageFont font
    font for annotations
'''
out = []
missing = 0
for i, fns in enumerate((f for f in sets)):
    if i < skip:
        continue
    img_num = []
    for im in fns:
        img_num.append(im[-22:-4])
    with contextlib.ExitStack() as stack:
        try:
            imgs = [stack.enter_context(Image.open(f)) for f in fns]
            out.append(abutImages(imgs, names=img_num, show=show, save=save, \
                                prefix=f'{i :04d}-', path=path))
        except FileNotFoundError:
            print(f'File not found: {fns}. Skipping set {i}.')
            missing += 1
    if show and i % pause_frequency == 0:
        input(f'press any key to continue (current ballot:{i+1})')
    if stop_at is not None and i >= stop_at:
        break
print(f'{missing=}')
return out

```

In [7]:

```

def merge_pdfs(files, path, name):
    with contextlib.ExitStack() as stack:
        pdfMerger = PdfFileMerger()
        files = [stack.enter_context(open(path+f, 'rb')) for f in file_list if f.endswith('.pdf')]
        for f in files:
            pdfMerger.append(f)

```

```
with open(path+name, 'wb') as f:
    pdfMerger.write(f)
```

In [8]:

```
def count_pat(fn : str, pat : str):
    """
    create a dict of tokens matching a pattern in a text file

    Parameters
    -----
    fn : str
        filename to search
    pat : regular expression
        pattern to search for

    Returns
    -----
    d : dict
        key : distinct token matching the pattern
        value : count of occurrences of that token
    """
    found = defaultdict(lambda : 0)
    with open(fn) as f:
        for line in f:
            for match in re.finditer(pat, line):
                found[match.group(0)] += 1
    return(found)

def merge_counts(dicts : list):
    """
    merge counts in defaultdicts

    Parameters
    -----
    dicts : a list of defaultdicts

    Returns
    -----
    merged : defaultdict
        dict containing every key in the list of dicts, with corresponding values summed over all
        occurrences of the key in all the dicts
    """
    merged = dicts[0].copy()
    for d in dicts[1:]:
        for k,v in d.items():
```

```

        merged[k] += v
    return merged

def find_files(pattern, path : str):
    """
    Find files in path (and subdirectories) with names that match a regular expression

    Parameters
    -----
    pattern : regular expression
    path : starting path to crawl the directory tree

    """
    result = []
    for root, dir, files in os.walk(path):
        for f in files:
            mat = re.match(pattern, f)
            if mat:
                result.append(mat[1])
    return result

```

## Cleanup old runs

```

In [9]: paths = ['RW01/MC1/', 'RW01/MC2/', 'RW01/MC1/', 'RW01/MC2_Batches_43_44/', 'Fulton/Sample/']

if CLEANUP:
    for p in paths:
        for f in [f for f in os.listdir(save_stem+p) if f.endswith('.pdf')]:
            os.remove(save_stem+p+f)

```

## First machine count in RW01

```

In [10]: # original counts in RW01
fn = './Data/Dupes/Exh F-1 RW01_full_dupes_trips.xlsx'
save_path = save_stem + 'RW01/MC1/'
dupes = pd.read_excel(fn, sheet_name=0, header=0)
# Images 0-27 are pairs of purported duplicates

```

```

In [11]: dupes.head()

```

Out [11]:

	MC	filename without extension	detailed tabulator data	counting group	precinct portion	ballot type	is current	president	senate1	senate2	...	Session Type	Precinct Portion Id
0	MC1	05162_00234_000096	Absentee By Mail 3 ICC	Absentee by Mail	779-RW01	78	True	Donald J. Trump (I) (Rep)	Shane Hazel (Lib)	Annette Davis Jackson (Rep)	...	ScannedVote	769
1	MC1	05162_00235_000057	Absentee By Mail 3 ICC	Absentee by Mail	779-RW01	78	True	Donald J. Trump (I) (Rep)	Shane Hazel (Lib)	Annette Davis Jackson (Rep)	...	ScannedVote	769
2	MC1	05162_00234_000093	Absentee By Mail 3 ICC	Absentee by Mail	779-RW01	78	True	Donald J. Trump (I) (Rep)	David A. Perdue (I) (Rep)	Doug Collins (Rep)	...	ScannedVote	769
3	MC1	05162_00235_000054	Absentee By Mail 3 ICC	Absentee by Mail	779-RW01	78	True	Donald J. Trump (I) (Rep)	David A. Perdue (I) (Rep)	Doug Collins (Rep)	...	ScannedVote	769
4	MC1	05162_00234_000074	Absentee By Mail 3 ICC	Absentee by Mail	779-RW01	78	True	Donald J. Trump (I) (Rep)	David A. Perdue (I) (Rep)	Kelly Loeffler (I) (Rep)	...	ScannedVote	769

5 rows x 24 columns

In [12]:

```
# there are 14 purported pairs in RW01 MC1; read image identifiers for first 28 rows
img_nums = []
img_nums.append([f for f in dupes['filename without extension'][0:28]])
img_num_pairs = np.array(img_nums[0], dtype=str).reshape((int(len(img_nums[0])/2), 2))
for pr in img_num_pairs:
    print(f'{pr[0]}, {pr[1]}')
```

```
05162_00234_000096,05162_00235_000057
05162_00234_000093,05162_00235_000054
05162_00234_000074,05162_00235_000036
05162_00234_000072,05162_00235_000034
05162_00234_000068,05162_00235_000030
05162_00234_000069,05162_00235_000031
05162_00234_000054,05162_00235_000014
05162_00234_000031,05162_00235_000090
05162_00234_000026,05162_00235_000085
05162_00234_000017,05162_00235_000076
```



```
05162_00234_000013,05162_00235_000072
05162_00234_000014,05162_00235_000073
05162_00234_000003,05162_00235_000062
05162_00234_000001,05162_00235_000060
```

```
In [13]: images=[unpacklink(f, path=mc1_img_path) for f in img_nums[0]]
```

```
In [14]: # reshape so each row has a pair
im_pairs = np.array(images,dtype=str).reshape((int(len(images)/2),2))
```

```
In [15]: all_stack = flipThruSets(im_pairs, show=False, path=save_path)
```

```
missing=0
```

```
In [16]: # merge the stacked images
file_list = list([f for f in os.listdir(save_path) if f.endswith('.pdf')])
file_list.sort()

merge_pdfs(file_list, save_path, 'all_RW01_m1_dupes.pdf')
```

```
In [17]: # cleanup
for f in [fl for fl in file_list if fl.endswith('.pdf')]:
    os.remove(save_path+f)
```

## Confirm the images are among the CVRs

```
In [18]: # construct a dict of all image IDs in the exported CVRs
pat = re.compile('\d{5}_\d{5}_\d{6}')

# there are two CVR exports on different dates
dirs = ['./Data/Fulton Nov 03 Original/Results/CVR_Export_20210712120434/', \
        './Data/Fulton Nov 03 Original/Results/CVR_Export_20211124221250/']

file_start = 'CvrExport_'
file_end = '.json'

dict_list = []
n_images = 0
```

```
n_json_files = 0

for d in dirs:
    files = os.listdir(d)
    for f in [f for f in files if (f.startswith(file_start) and f.endswith(file_end))]:
        n_json_files += 1
        found = count_pat(d+f,pat)
        n_images += len(found)
        dict_list.append(found)
```

```
In [19]: # merge counts
cvr_img_refs = []
cvr_img_refs.append(merge_counts(dict_list))
print(f'{n_json_files=}, {n_images=}, min,max multiplicity: {min(cvr_img_refs[0].values()),{max(cvr_img_refs[0].values())}')
```

```
n_json_files=4366, n_images=1057552, min,max multiplicity: 2,2
```

```
In [20]: n_images_mc1 = n_images/2 # each image appears in two CVRs, one for each export
```

```
In [21]: # check whether IDs of all replicated images are in the dict
has_cvr = np.all([img in cvr_img_refs[0] for img in img_nums[0]])
has_cvr
```

```
Out[21]: True
```

## 2nd machine count in RW01

```
In [22]: # 2nd counts in RW01
save_path = save_stem + 'RW01/MC2/'
fn = './Data/Dupes/Exh F-1 RW01_full_dupes_trips.xlsx'
dupes = pd.read_excel(fn, sheet_name=1, header=0)
dupes.head()
```

```
Out[22]:
```

MC	filename without extension	detailed tabulator data	counting group	precinct portion	is current	is president	senate1	senate2	precinct portion_1	TabuBatch	Session Type
----	----------------------------	-------------------------	----------------	------------------	------------	--------------	---------	---------	--------------------	-----------	--------------

MC	filename without extension	detailed tabulator data	counting group	precinct portion	is current	president	senate1	senate2	precinct portion_1	TabuBatch	Session Type
0	MC2 00801_00044_000168	Early Voting ICC 2	Advanced Voting	779-RW01	True	Donald J. Trump (I) (Rep)	David A. Perdue (I) (Rep)	Kelly Loeffler (I) (Rep)	779-RW01	00801_00044	QRVote
1	MC2 00801_00043_000168	Early Voting ICC 2	Advanced Voting	779-RW01	True	Donald J. Trump (I) (Rep)	David A. Perdue (I) (Rep)	Kelly Loeffler (I) (Rep)	779-RW01	00801_00043	QRVote
2	MC2 00801_00044_000083	Early Voting ICC 2	Advanced Voting	779-RW01	True	Donald J. Trump (I) (Rep)	David A. Perdue (I) (Rep)	Doug Collins (Rep)	779-RW01	00801_00044	QRVote
3	MC2 00801_00043_000083	Early Voting ICC 2	Advanced Voting	779-RW01	True	Donald J. Trump (I) (Rep)	David A. Perdue (I) (Rep)	Doug Collins (Rep)	779-RW01	00801_00043	QRVote
4	MC2 00801_00044_000042	Early Voting ICC 2	Advanced Voting	779-RW01	True	Donald J. Trump (I) (Rep)	David A. Perdue (I) (Rep)	Kelly Loeffler (I) (Rep)	779-RW01	00801_00044	QRVote

In [23]:

```

# make array of image filenames
last_row = 29 # the first 29 rows list the dupes and triplicates
img_nums.append(dupes['filename without extension'][0:last_row])
images=[unpacklink(f, path=mc2_img_path) for f in img_nums[1]]
img_sets = dupes['Duplicate Set '][0:last_row]

# detect sets using the 'Duplicate Set ' value
im_sets = []
curr_set = img_sets[0]
temp = []

for i, im in enumerate(images):
    if img_sets[i] == curr_set: # same group
        temp.append(im)
    else: # new group
        im_sets.append(temp)
        curr_set = img_sets[i]
        temp = [im]
im_sets.append(temp) # add final group

```

In [24]:

```
# to make table in report
dups['filename without extension'][0:last_row]
```

```
Out[24]: 0    00801_00044_000168
1    00801_00043_000168
2    00801_00044_000083
3    00801_00043_000083
4    00801_00044_000042
5    00801_00043_000042
6    05160_00074_000023
7    05160_00067_000008
8    00794_00017_000024
9    00791_00026_000091
10   00791_00019_000010
11   00794_00017_000029
12   00791_00026_000086
13   00791_00019_000015
14   00794_00018_000001
15   00791_00026_000009
16   00791_00019_000092
17   00794_00018_000011
18   00791_00026_000019
19   00791_00019_000082
20   00794_00019_000002
21   00791_00026_000079
22   00791_00019_000022
23   00794_00019_000005
24   00791_00026_000076
25   00791_00019_000025
26   00794_00019_000006
27   00791_00026_000075
28   00791_00019_000026
Name: filename without extension, dtype: object
```

```
In [25]: # generate files of image sets
all_stack = flipThruSets(im_sets, show=False, path=save_path)
```

```
missing=0
```

```
In [26]: file_list = list([f for f in os.listdir(save_path) if f.endswith('.pdf')])
file_list.sort()

merge_pdfs(file_list, save_path, 'all_RW01_m2_dupes.pdf')
```

In [27]:

```
# cleanup
for f in [fl for fl in file_list if fl.endswith('.pdf')]:
    os.remove(save_path+f)
```

## Check images against CVR image references for MC2

In [28]:

```
# construct a dict of all image IDs in the exported CVRs
pat = re.compile('\d{5}_\d{5}_\d{6}') # match image filenames (without extension)
dirs = ['./Data/Nov 03 2020 recount/Results/CVR_Export_20211123180059/']

file_start = 'CvrExport_'
file_end = '.json'

dict_list = []

n_images = 0
n_json_files = 0
for d in dirs:
    files = os.listdir(d)
    for f in [f for f in files if (f.startswith(file_start) and f.endswith(file_end))]:
        n_json_files += 1
        found = count_pat(d+f, pat)
        n_images += len(found)
        dict_list.append(found)
```

In [29]:

```
# merge counts
cvr_img_refs.append(merge_counts(dict_list))
print(f'{n_json_files=}, {n_images=}, min,max multiplicity: {min(cvr_img_refs[1].values())}, {max(cvr_img_refs[1].values())}')

n_json_files=3729, n_images=527925, min,max multiplicity: 1,1
```

In [30]:

```
# check whether all were included in the tabulation
has_cvr = np.all([img in cvr_img_refs[1] for img in img_nums[1]])
has_cvr
```

Out[30]: True

In [31]:

```
n_images_mc2 = n_images
```

## Check BMD scan repeats from scanner 801, batches 43 and 44 to confirm

```
In [32]: stems = ['00801_00043_', '00801_00044_']
im_sets = []
img_nums.append([])
for i in range(1, 215):
    temp = []
    for s in stems:
        img_nums[2].append(f'{s}{i :06d}')
        temp.append(unpacklink(f'{s}{i :06d}', path=mc2_img_path))
    im_sets.append(temp)
```

```
In [33]: save_path = save_stem + 'RW01/MC2_Batches_43_44/'
all_stack_43_44 = flipThruSets(im_sets, show=False, path=save_path)
```

missing=0

```
In [34]: # merge the stacked images
file_list = list([f for f in os.listdir(save_path) if f.endswith('.pdf')])
file_list.sort()

merge_pdfs(file_list, save_path, 'all_RW01_43_44_dupes.pdf')
```

```
In [35]: # cleanup
for f in [fl for fl in file_list if fl.endswith('.pdf')]:
    os.remove(save_path+f)
```

```
In [36]: # check that all these were included in the tabulation
has_img = np.all([img in cvr_img_refs[1] for img in img_nums[2]])
has_img
```

Out[36]: True

## Identify which image files mentioned in CVRs are missing

```
In [37]: pat_tab = re.compile(r'(\d{5}_\d{5}_\d{6})\.tif')
```

In [38]:

```
# find all ballot .tif files in the Results folder and sub-folders

base = ['./Data/Fulton Nov 03 Original/Results/', './Data/Nov 03 2020 recount/Results/']
all_tifs = []

for b in base:
    all_tifs.append(find_files(pat_tab, b))
```

In [39]:

```
# missing .tif files
missing_images = []
for i in range(2):
    missing_images.append(set(cvr_img_refs[i].keys())-set(all_tifs[i]))
    print(f'MC{i+1} image files: {len(all_tifs[i])}; missing: {len(list(missing_images[i]))}')

MC1 image files: 168726; missing: 376863
MC2 image files: 510073; missing: 17852
```

In [40]:

```
[len(set(cvr_img_refs[i].keys())) for i in range(2)]
```

Out[40]:

```
[528776, 527925]
```

In [41]:

```
# difference in the number of cast vote records for MC1 and MC2 if every CVR references an image
len(set(cvr_img_refs[0].keys()))-len(set(cvr_img_refs[1].keys()))
```

Out[41]:

```
851
```

## Process CVRs to tabulate presidential race

In [42]:

```
# Read the json CVRs
base = ['./Data/Fulton Nov 03 Original/Results/CVR_Export_20211124221250/', \
        './Data/Nov 03 2020 recount/Results/CVR_Export_20211123180059/']
cvr_pat = re.compile(r'CvrExport_\d+\.json') # match CvrExport filenames
cvrs = []
cvr_files = []

for b in base:
    cvrs.append({})
```

```

cvrs[-1]['Sessions'] = []
cvr_files.append(list([f for f in os.listdir(b) if re.match(cvr_pat,f)]))
for cv in cvr_files[-1]:
    with open(b+cv,'r') as f:
        cvrs[-1]['Sessions'] += (json.load(f))['Sessions']

```

In [43]:

```

# check for adjudication (IsCurrent) and for IsVote flag
pres = []
modified = []
n_cvrs = []

for i in range(2):
    pres.append([])
    n_cvrs.append(0)
    modified.append(0)
    for s in cvrs[i]['Sessions']:
        n_cvrs[-1] += 1
        if s['Original']['IsCurrent']:
            for c in s['Original']['Cards']:
                for m in (c['Contests']['Id']==1)['Marks']:
                    if m['IsVote']:
                        pres[-1].append(m['CandidateId'])
        else:
            modified[-1] += 1
            for c in s['Modified']['Cards']:
                for m in (c['Contests']['Id']==1)['Marks']:
                    if m['IsVote']:
                        pres[-1].append(m['CandidateId'])

print(f'{n_cvrs} cvrs, difference {n_cvrs[0]-n_cvrs[1]}. {modified} adjudicated')

```

[528776, 527925] cvrs, difference 851. [5157, 1400] adjudicated

In [44]:

```

candidates = ['Trump','Biden','Jorgensen']

for i,c in enumerate(candidates):
    print(f'{c}:\t\t{pres[0].count(i+1)} \t{pres[1].count(i+1)} ')

```

Trump:	137240	137247
Biden:	381144	380212
Jorgensen:	6275	6320



## Other duplicates and triplicates

In [45]:

```
fn = './Data/Dupes/Fulton_MC2_2871_rows_JSON_CVR_dups_trips_one_row_per_paper_ballot.xlsx'
dupes = pd.read_excel(fn, sheet_name=0, skiprows=4, header=0)
dupes.head()
```

Out[45]:

	Fulton CVR from JSON	Count	filename with extension	duplicate - green if confirmed visually or if no image then by CVR	confirmed matching triplicate or notes	detailed tabulator data	tabulator	batch	ballot number	counting group	...	curr
0	Fulton CVR	MC2	00742_00040_000002.tif	00742_00042_000074.tif	NaN	Absentee By Mail ICC 6	742	40	2	Absentee by Mail	...	T
1	Fulton CVR	MC2	00742_00040_000003.tif	00742_00042_000075.tif	NaN	Absentee By Mail ICC 6	742	40	3	Absentee by Mail	...	T
2	Fulton CVR	MC2	00742_00040_000004.tif	00742_00042_000076.tif	NaN	Absentee By Mail ICC 6	742	40	4	Absentee by Mail	...	T
3	Fulton CVR	MC2	00742_00040_000005.tif	00742_00042_000077.tif	NaN	Absentee By Mail ICC 6	742	40	5	Absentee by Mail	...	T
4	Fulton CVR	MC2	00742_00040_000006.tif	00742_00042_000078.tif	NaN	Absentee By Mail ICC 6	742	40	6	Absentee by Mail	...	T

5 rows x 22 columns

In [46]:

```
dupes.columns
```

Out[46]:

```
Index(['Fulton CVR from JSON', 'Count', 'filename with extension',  
      'duplicate - green if confirmed visually or if no image then by CVR',  
      'confirmed matching triplicate or notes', 'detailed tabulator data',  
      'tabulator', 'batch', 'ballot number', 'counting group',  
      'precinct portion', 'ballot type', 'is current',  
      '"M" means missing in MC2', 'image code', 'Unnamed: 15', 'president',  
      'senate1', 'Unnamed: 18', 'senate2', 'Unnamed: 20', 'BCI signature'],  
      dtype='object')
```

```
In [47]: uno, dos, tres = 'filename with extension',\
                    'duplicate - green if confirmed visually or if no image then by CVR',\
                    'confirmed matching triplicate or notes'

pat = re.compile('\d{5}_\d{5}_\d{6}\.tif')
firsts = list(dupes[uno])
seconds = list([t for t in dupes[dos] if pat.match(str(t))])
thirds = list([t for t in dupes[tres] if pat.match(str(t))])
img_nums.append([]) # this is img_nums[3]
for x in [firsts, seconds, thirds]:
    for i in x:
        img_nums[3].append(i)

# remove '.tif' from the ends of the strings
for i in range(len(img_nums[3])):
    img_nums[3][i] = img_nums[3][i][:-4]

len(img_nums[3])
```

Out[47]: 6118

```
In [48]: # verify that the images were included in MC2
has_img = np.all([img in cvr_img_refs[1] for img in img_nums[3]])
has_img
```

Out[48]: True

```
In [49]: # isolate HMPB
is_hmpb = dupes['detailed tabulator data'].str.match('Absentee')
np.sum(is_hmpb), len(is_hmpb)
```

Out[49]: (916, 2871)

```
In [50]: # construct the pairs and triples
img_sets = []

for i in range(len(dupes[uno])):
    temp = [unpacklink(dupes.iloc[i][uno][:-4], path=mc2_img_path)]
    if pat.match(str(dupes.iloc[i][dos])):
        temp.append(unpacklink(dupes.iloc[i][dos][:-4], path=mc2_img_path))
    if pat.match(str(dupes.iloc[i][tres])):
```

```
temp.append(unpacklink(dupes.iloc[i][tres][:-4], path=mc2_img_path))
img_sets.append(temp)
```

```
In [51]: np.sum(has_img & is_hmpb)
```

```
Out[51]: 916
```

```
In [52]: has_img = []
for imn in img_sets:
    has_img.append(not any([im in missing_images[1] for im in imn]))

filter = has_img & is_hmpb

print(f'sets:{len(img_sets)} sets w images:{np.sum(has_img)} HMPB sets w images:{np.sum(filter)}')
```

```
sets:2871 sets w images:2871 HMPB sets w images:916
```

```
In [53]: img_set_frame = []
for i in range(len(img_sets)):
    if filter[i]:
        img_set_frame.append(img_sets[i])
len(img_set_frame)
```

```
Out[53]: 916
```

## Draw random sample of other dupes

```
In [54]: # draw sample
seed = 8628922184 # 10 rolls of 10-sided dice
prng = cr.SHA256(seed)
sam_size = 100
pop_size = len(img_set_frame)
sam = random_sample(pop_size, sam_size, prng=prng)
```

```
In [55]: # find the sampled rows and generate the sample image sets
sample_sets = []
for i in sam:
    sample_sets.append(img_set_frame[i])
```

```
In [56]: save_path = './Img/Fulton/Sample/'
sample_stack = flipThruSets(sample_sets, show=False, path=save_path)

missing=0
```

```
In [57]: # merge the stacked images
file_list = list([f for f in os.listdir(save_path) if f.endswith('.pdf')])
file_list.sort()

merge_pdfs(file_list, save_path, 'all_sample.pdf')
```

```
In [58]: # cleanup
for f in [fl for fl in file_list if fl.endswith('.pdf')]:
    os.remove(save_path+f)
```

```
In [59]: triples = 0
doubles = 0
for s in sample_sets:
    triples += (1 if len(s) == 3 else 0)
    doubles += (1 if len(s) == 2 else 0)
    if len(s) < 2:
        print(s)

doubles, triples
```

```
Out[59]: ['./Data/Nov 03 2020 recount/Results/Tabulator00791/Batch022/Images/00791_00022_000003.tif']
(53, 46)
```

The sheet asserts that 00791\_00022\_000003.tif is the same as something in the same batch. I was unable to verify that.

I found one other disagreement: 00791\_00022\_000030 does not match 00794\_00009\_000008

## Lower confidence bound for the number of sets of repeats

```
In [60]: # find number of sets where all filenames are present
found_imgs = 98
```

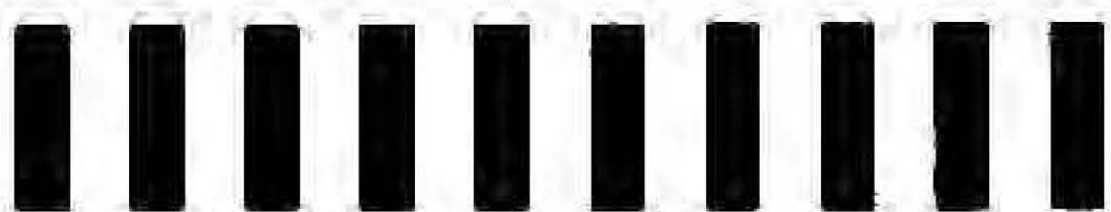
```
In [61]: # lower confidence bound for the number of correctly identified duplicates/triplicates
stl_lb = hypergeom_conf_interval(sam_size, sam_size, pop_size, cl=0.95, alternative="lower")
print(f'{stl_lb=}')

```

```
stl_lb=(891, 916)
```

# **APPENDIX 7**

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# OFFICIAL ABSE

## OFFICIAL

### INSTRUCTIONS:

#### To Vote

1. Use black or blue ink to mark the ballot
2. Completely fill in the empty oval to the  
all races you wish to vote
3. If voting for a Write-In candidate, complete  
the Write-In selection, then write the name  
provided

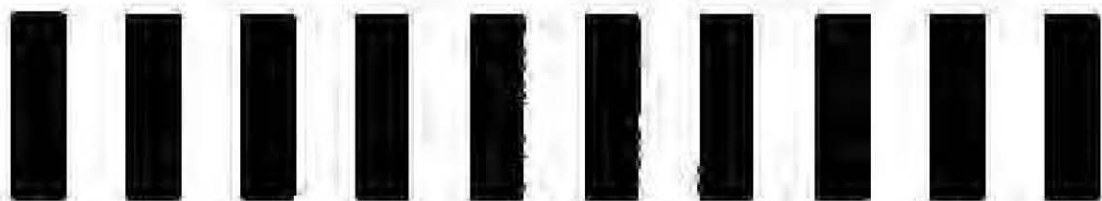
#### If you make a mistake or change your

- A. Do not attempt to mark through the seal
- B. Mail or return the sealed ballot and envelope

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**For State Representative  
In the General Assembly From  
48th District  
(Vote for One)**

**Betty Price**  
Republican

**Mary Roblchaux**  
(Incumbent) Democrat



---

**Write-In**

---

**For District Attorney of the  
Atlanta Judicial Circuit  
(Vote for One)**



05162\_00234\_000096.tif scanned at: 19:40:02 on 11/03/20.

Scanned on: ICC Tabulator: 5162 Batch: 234

Poll ID: 317 Ballot ID: 676

President of the United States

Donald J. Trump (I) (Rep)

US Senate (Perdue)

Shane Hazel (Lib)

US Senate (Loeffler) - Special

Annette Davis Jackson (Rep)

Public Service Commission District 1

Elizabeth Melton (Lib)

Public Service Commission District 4

Lauren Bubba McDonald, Jr. (I) (Rep)

US House District 6

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# OFFICIAL ABSE

## OFFICIAL

### INSTRUCTIONS:

#### To Vote

1. Use black or blue ink to mark the ballot
2. Completely fill in the empty oval to the  
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3. If voting for a Write-In candidate, complete  
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**For State Representative  
In the General Assembly From  
48th District  
(Vote for One)**

- Betty Price**  
Republican
- Mary Robichaux**  
(Incumbent) Democrat
- 

**Write-in**

**For District Attorney of the  
Atlanta Judicial Circuit  
(Vote for One)**

05162\_00234\_000093.tif scanned at: 19:39:59 on 11/03/20.

Scanned on: ICC Tabulator: 5162 Batch: 234

Poll ID: 317 Ballot ID: 676

President of the United States

Donald J. Trump (I) (Rep)

US Senate (Perdue)

David A. Perdue (I) (Rep)

US Senate (Loeffler) - Special

Doug Collins (Rep)

Public Service Commission District 1

Jason Shaw (I) (Rep)

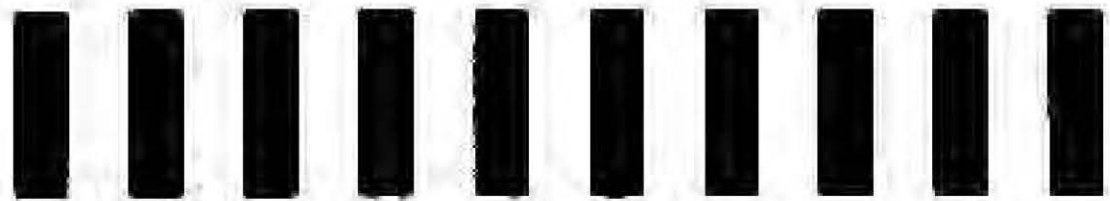
Public Service Commission District 4

Lauren Bubba McDonald, Jr. (I) (Rep)

US House District 6

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# OFFICIAL ABSE

## OFFICIAL

### INSTRUCTIONS:

#### To Vote

1. Use black or blue ink to mark the ballot
2. Completely fill in the empty oval to the  
all races you wish to vote
3. If voting for a Write-In candidate, complete  
the Write-In selection, then write the name  
provided

#### If you make a mistake or change your

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**For State Representative  
In the General Assembly From  
48th District  
(Vote for One)**

- Betty Price**  
Republican
- Mary Robichaux**  
(Incumbent) Democrat
- 

**Write-in**

**For District Attorney of the  
Atlanta Judicial Circuit  
(Vote for One)**

05162\_00234\_000074.tif scanned at: 19:39:45 on 11/03/20.

Scanned on: ICC Tabulator: 5162 Batch: 234

Poll ID: 317 Ballot ID: 676

President of the United States

Donald J. Trump (I) (Rep)

US Senate (Perdue)

David A. Perdue (I) (Rep)

US Senate (Loeffler) - Special

Kelly Loeffler (I) (Rep)

Public Service Commission District 1

Jason Shaw (I) (Rep)

Public Service Commission District 4

Lauren Bubba McDonald, Jr. (I) (Rep)

US House District 6

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# OFFICIAL ABSE

## OFFICIAL

### INSTRUCTIONS:

#### To Vote

1. Use black or blue ink to mark the ballot
2. Completely fill in the empty oval to the  
all races you wish to vote
3. If voting for a Write-In candidate, complete  
the Write-In selection, then write the name  
provided

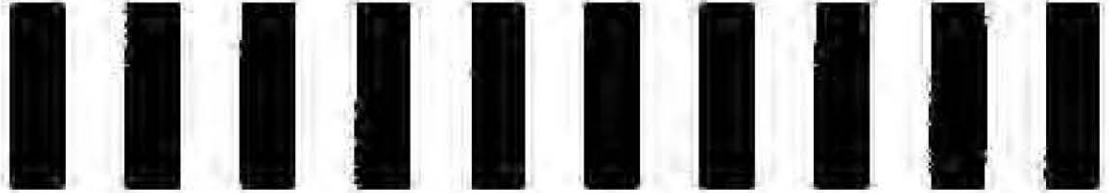
#### If you make a mistake or change your

- A. Do not attempt to mark through the seal
- B. Mail or return the spoiled ballot and a



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**For State Representative  
In the General Assembly From  
48th District  
(Vote for One)**



**Betty Price**  
Republican



**Mary Roblchaux**  
(Incumbent) Democrat



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**Write-in**

---

**For District Attorney of the  
Atlanta Judicial Circuit  
(Vote for One)**

05162\_00234\_000072.tif scanned at: 19:39:43 on 11/03/20.

Scanned on: ICC Tabulator: 5162 Batch: 234

Poll ID: 317 Ballot ID: 676

President of the United States

Jo Jorgensen (Lib)

US Senate (Perdue)

David A. Perdue (I) (Rep)

US Senate (Loeffler) - Special

Kelly Loeffler (I) (Rep)

Public Service Commission District 1

Jason Shaw (I) (Rep)

Public Service Commission District 4

Lauren Bubba McDonald, Jr. (I) (Rep)

US House District 6

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# OFFICIAL ABSE

## OFFICIAL

### INSTRUCTIONS:

#### To Vote

1. Use black or blue ink to mark the ballot
2. Completely fill in the empty oval to the all races you wish to vote
3. If voting for a Write-In candidate, complete the Write-In selection, then write the name provided

#### If you make a mistake or change your

- A. Do not attempt to mark through the seal
- B. Mail or return the spoiled ballot and a

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**For State Representative  
In the General Assembly From  
48th District  
(Vote for One)**

- Betty Price**  
Republican
- Mary Robichaux**  
(Incumbent) Democrat
- 

**Write-in**

**For District Attorney of the  
Atlanta Judicial Circuit  
(Vote for One)**

05162\_00234\_000068.tif scanned at: 19:39:41 on 11/03/20.

Scanned on: ICC Tabulator: 5162 Batch: 234

Poll ID: 317 Ballot ID: 676

President of the United States

Donald J. Trump (I) (Rep)

US Senate (Perdue)

David A. Perdue (I) (Rep)

US Senate (Loeffler) - Special

Kelly Loeffler (I) (Rep)

Public Service Commission District 1

Jason Shaw (I) (Rep)

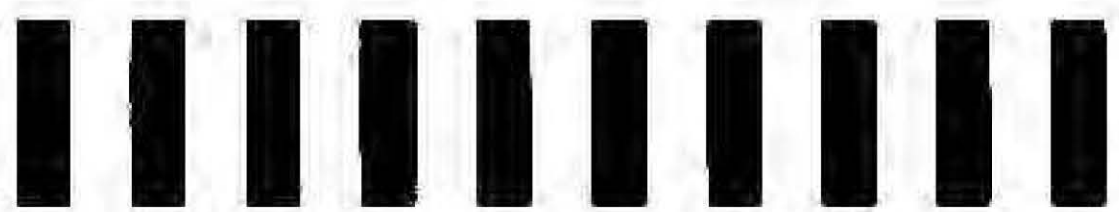
Public Service Commission District 4

Lauren Bubba McDonald, Jr. (I) (Rep)

US House District 6

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# OFFICIAL ABSE

## OFFICIAL

### INSTRUCTIONS:

#### To Vote

1. Use black or blue ink to mark the ballot
2. Completely fill in the empty oval to the all races you wish to vote
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#### If you make a mistake or change your

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**For State Representative  
In the General Assembly From  
48th District  
(Vote for One)**

**Betty Price**  
Republican

**Mary Robichaux**  
(Incumbent) Democrat



**Write-In**

**For District Attorney of the  
Atlanta Judicial Circuit  
(Vote for One)**

05162\_00234\_000069.tif scanned at: 19:39:41 on 11/03/20.

Scanned on: ICC Tabulator: 5162 Batch: 234

Poll ID: 317 Ballot ID: 676

President of the United States

Donald J. Trump (I) (Rep)

US Senate (Perdue)

David A. Perdue (I) (Rep)

US Senate (Loeffler) - Special

Kelly Loeffler (I) (Rep)

Public Service Commission District 1

Jason Shaw (I) (Rep)

Public Service Commission District 4

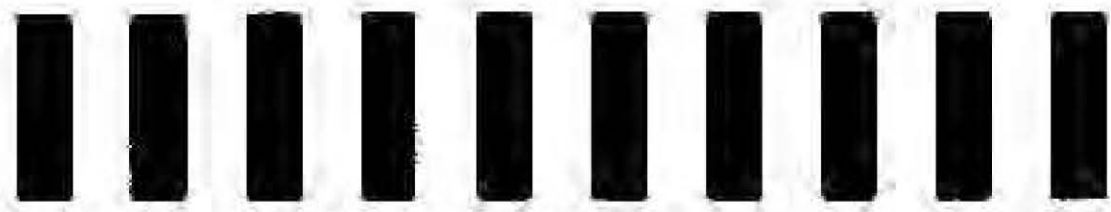
Lauren Bubba McDonald, Jr. (I) (Rep)

US House District 6

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# OFFICIAL ABSE

## OFFICIAL

### INSTRUCTIONS:

#### To Vote

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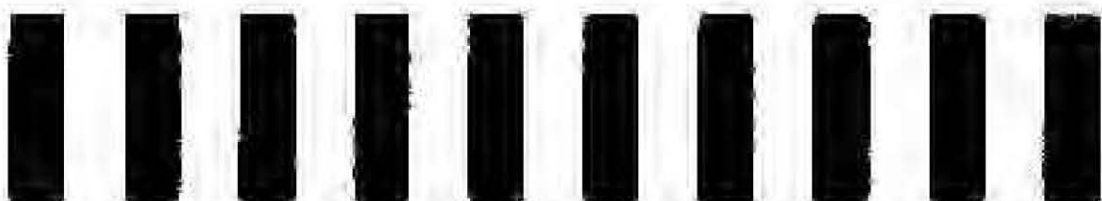
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**For State Representative  
In the General Assembly From  
48th District  
(Vote for One)**

- Betty Price**  
Republican
- Mary Robichaux**  
(Incumbent) Democrat
- 

**Write-in**

**For District Attorney of the  
Atlanta Judicial Circuit  
(Vote for One)**

05162\_00234\_000054.tif scanned at: 19:39:30 on 11/03/20.

Scanned on: ICC Tabulator: 5162 Batch: 234

Poll ID: 317 Ballot ID: 676

President of the United States

Donald J. Trump (I) (Rep)

US Senate (Perdue)

David A. Perdue (I) (Rep)

US Senate (Loeffler) - Special

Doug Collins (Rep)

Public Service Commission District 1

Jason Shaw (I) (Rep)

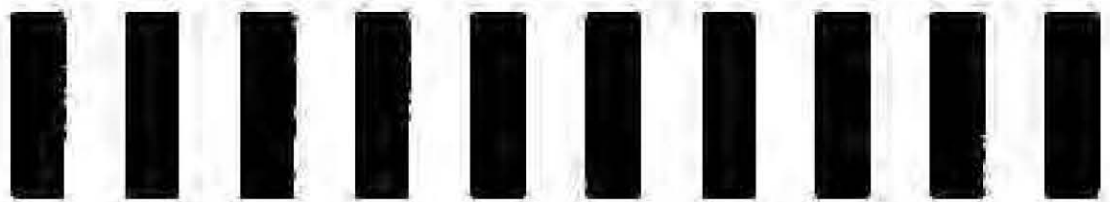
Public Service Commission District 4

Lauren Bubba McDonald, Jr. (I) (Rep)

US House District 6

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# OFFICIAL ABSE

## OFFICIAL

### INSTRUCTIONS:

#### To Vote

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provided

#### If you make a mistake or change your

- A. Do not attempt to mark through the seal
- B. Mail or return the spoiled ballot and a

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**For State Representative  
In the General Assembly From  
48th District  
(Vote for One)**

- Betty Price**  
Republican
- Mary Robichaux**  
(Incumbent) Democrat
- 

**Write-in**

**For District Attorney of the  
Atlanta Judicial Circuit  
(Vote for One)**

05162\_00234\_000031.tif scanned at: 19:39:11 on 11/03/20.

Scanned on: ICC Tabulator: 5162 Batch: 234

Poll ID: 317 Ballot ID: 676

President of the United States

Joseph R. Biden (Dem)

US Senate (Perdue)

Jon Ossoff (Dem)

US Senate (Loeffler) - Special

Raphael Warnock (Dem)

Public Service Commission District 1

Robert G. Bryant (Dem)

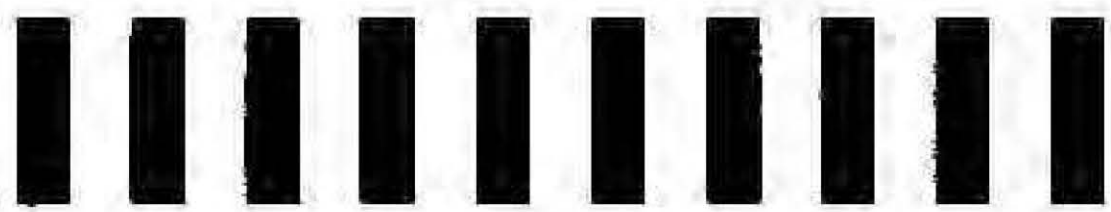
Public Service Commission District 4

Daniel Blackman (Dem)

US House District 6

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# OFFICIAL ABSE

## OFFICIAL

### INSTRUCTIONS:

#### To Vote

1. Use black or blue ink to mark the ballot
2. Completely fill in the empty oval to the  
all races you wish to vote
3. If voting for a Write-In candidate, complete  
the Write-In selection, then write the name  
provided

#### If you make a mistake or change your

- A. Do not attempt to mark through the seal
- B. Mail or return the sealed ballot and a





05162\_00234\_000026.tif scanned at: 19:39:07 on 11/03/20.

Scanned on: ICC Tabulator: 5162 Batch: 234

Poll ID: 317 Ballot ID: 676

President of the United States

Donald J. Trump (I) (Rep)

US Senate (Perdue)

David A. Perdue (I) (Rep)

US Senate (Loeffler) - Special

Raphael Warnock (Dem)

Public Service Commission District 1

Jason Shaw (I) (Rep)

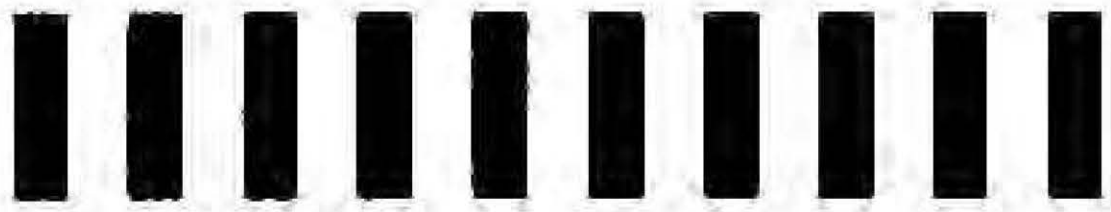
Public Service Commission District 4

Lauren Bubba McDonald, Jr. (I) (Rep)

US House District 6

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# OFFICIAL ABSE

## OFFICIAL

### INSTRUCTIONS:

#### To Vote

1. Use black or blue ink to mark the ballo
2. Completely fill in the empty oval to the all races you wish to vote
3. If voting for a Write-In candidate, comp the Write-In selection, then write the nam provided

#### If you make a mistake or change your

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**For State Representative  
In the General Assembly From  
48th District  
(Vote for One)**

- Betty Price**  
Republican
- Mary Roblchaux**  
(Incumbent) Democrat
- 

---

**Write-in**

**For District Attorney of the  
Atlanta Judicial Circuit  
(Vote for One)**

05162\_00234\_000017.tif scanned at: 19:39:00 on 11/03/20.

Scanned on: ICC Tabulator: 5162 Batch: 234

Poll ID: 317 Ballot ID: 676

President of the United States

Joseph R. Biden (Dem)

US Senate (Perdue)

Jon Ossoff (Dem)

US Senate (Loeffler) - Special

Raphael Warnock (Dem)

Public Service Commission District 1

Robert G. Bryant (Dem)

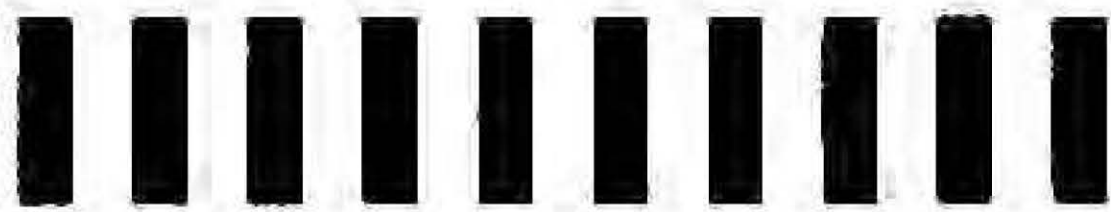
Public Service Commission District 4

Daniel Blackman (Dem)

US House District 6

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# OFFICIAL ABSE

## OFFICIAL

### INSTRUCTIONS:

#### To Vote

1. Use black or blue ink to mark the ballot
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3. If voting for a Write-In candidate, complete  
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**For State Representative  
In the General Assembly From  
48th District  
(Vote for One)**

- Betty Price**  
Republican
  
- Mary Roblchaux**  
(Incumbent) Democrat
  
- 

**Write-In**

**For District Attorney of the  
Atlanta Judicial Circuit  
(Vote for One)**

05162\_00234\_000013.tif scanned at: 19:38:57 on 11/03/20.

Scanned on: ICC Tabulator: 5162 Batch: 234

Poll ID: 317 Ballot ID: 676

President of the United States

Joseph R. Biden (Dem)

US Senate (Perdue)

David A. Perdue (I) (Rep)

US Senate (Loeffler) - Special

Doug Collins (Rep)

Public Service Commission District 1

BLANK CONTEST

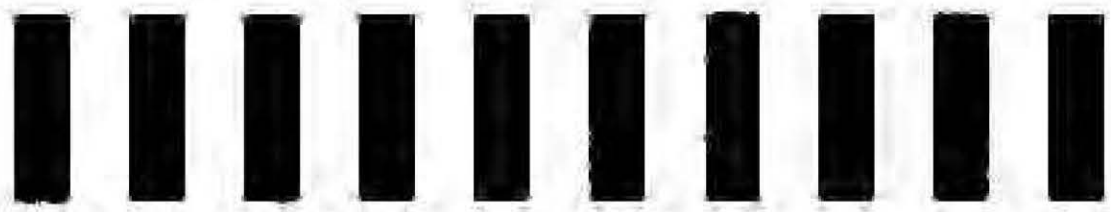
Public Service Commission District 4

BLANK CONTEST

US House District 6

0516200234000013

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# OFFICIAL ABSE

## OFFICIAL

### INSTRUCTIONS:

- To Vote**
1. Use black or blue ink to mark the ballo
  2. Completely fill in the empty oval to the all races you wish to vote
  3. If voting for a Write-In candidate, comp the Write-In selection, then write the nam provided

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**For State Representative  
In the General Assembly From  
48th District  
(Vote for One)**

**Betty Price**  
Republican

**Mary Robichaux**  
(Incumbent) Democrat

**Write-in**

**For District Attorney of the  
Atlanta Judicial Circuit  
(Vote for One)**

05162\_00234\_000014.tif scanned at: 19:38:57 on 11/03/20.

Scanned on: ICC Tabulator: 5162 Batch: 234

Poll ID: 317 Ballot ID: 676

President of the United States

Donald J. Trump (I) (Rep)

US Senate (Perdue)

David A. Perdue (I) (Rep)

US Senate (Loeffler) - Special

Doug Collins (Rep)

Public Service Commission District 1

Jason Shaw (I) (Rep)

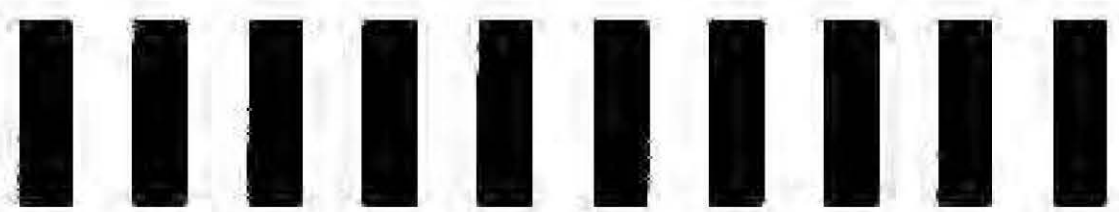
Public Service Commission District 4

Lauren Bubba McDonald, Jr. (I) (Rep)

US House District 6

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# OFFICIAL ABSE

## OFFICIAL

### INSTRUCTIONS:

#### To Vote

1. Use black or blue ink to mark the ballot
2. Completely fill in the empty oval to the  
all races you wish to vote
3. If voting for a Write-In candidate, complete  
the Write-In selection, then write the name  
provided

#### If you make a mistake or change your

- A. Do not attempt to mark through the seal
- B. Mail the ballot in the provided envelope

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**For State Representative  
In the General Assembly From  
48th District  
(Vote for One)**

- Betty Price**  
Republican
- Mary Robichaux**  
(Incumbent) Democrat
- 

**Write-in**

**For District Attorney of the  
Atlanta Judicial Circuit  
(Vote for One)**

05162\_00234\_000003.tif scanned at: 19:38:48 on 11/03/20.

Scanned on: ICC Tabulator: 5162 Batch: 234

Poll ID: 317 Ballot ID: 676

President of the United States

Joseph R. Biden (Dem)

US Senate (Perdue)

Jon Ossoff (Dem)

US Senate (Loeffler) - Special

Raphael Warnock (Dem)

Public Service Commission District 1

Robert G. Bryant (Dem)

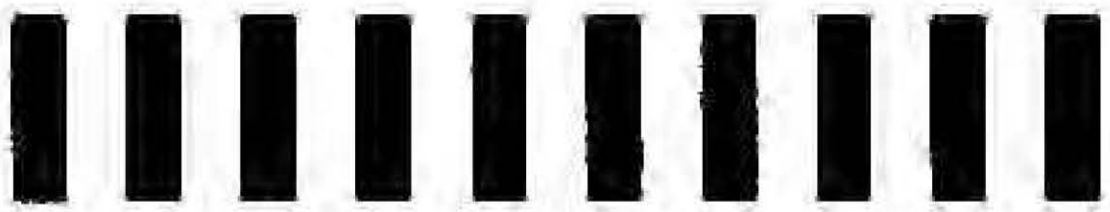
Public Service Commission District 4

Daniel Blackman (Dem)

US House District 6

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# OFFICIAL ABSE

## OFFICIAL

### INSTRUCTIONS:

#### To Vote

1. Use black or blue ink to mark the ballot
2. Completely fill in the empty oval to the  
all races you wish to vote
3. If voting for a Write-In candidate, complete  
the Write-In selection, then write the name  
provided

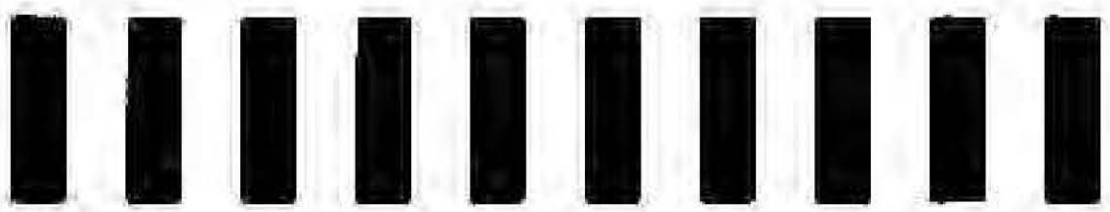
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**For State Representative  
In the General Assembly From  
48th District  
(Vote for One)**

**Betty Price**  
Republican

**Mary Robichaux**  
(Incumbent) Democrat

**Write-in**

**For District Attorney of the  
Atlanta Judicial Circuit  
(Vote for One)**

05162\_00234\_000001.tif scanned at: 19:38:46 on 11/03/20.

Scanned on: ICC Tabulator: 5162 Batch: 234

Poll ID: 317 Ballot ID: 676

President of the United States

Joseph R. Biden (Dem)

US Senate (Perdue)

Jon Ossoff (Dem)

US Senate (Loeffler) - Special

Deborah Jackson (Dem)

Public Service Commission District 1

Robert G. Bryant (Dem)

Public Service Commission District 4

Daniel Blackman (Dem)

US House District 6

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# **APPENDIX 8**

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**FULTON COUNTY**  
**OFFICE OF THE CLERK**  
**GENERAL AND ELECTIONS**  
**OF THE STATE OF GEORGIA**  
**NOVEMBER 5, 2008**

*"I understand that the offer or acceptance of money or any other thing of value for the purpose of influencing the outcome of an election, or for the purpose of influencing the selection of a list of candidates, issue, or list of issues included in a ballot, is prohibited under Georgia law." [O.C.G.A. 21-2-1]*

779-RW01



00801\_00044\_000168.tif scanned at: 19:00:03 on 12/01/20.

Scanned on: ICC Tabulator: 801 Batch: 44

Poll ID: 317 Ballot ID: 676

President of the United States

Donald J. Trump (I) (Rep)

US Senate (Perdue)

David A. Perdue (I) (Rep)

US Senate (Loeffler) - Special

Kelly Loeffler (I) (Rep)

Public Service Commission District 1

Jason Shaw (I) (Rep)

Public Service Commission District 4

Lauren Bubba McDonald, Jr. (I) (Rep)

US House District 6

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FULTON

OFFICIAL

GENERAL ANNUAL

OF THE STATE

NOVEMBER

*"I understand that the offer or acceptance of money or any other thing of value for the purpose of influencing the vote of any elector on any question, list of candidates, issue, or list of issues included in the ballot for the general annual election of the State of Georgia under Georgia law." [O.C.G.A. 2-2-1]*

779-RW01



00801\_00044\_000083.tif scanned at: 18:59:28 on 12/01/20.

Scanned on: ICC Tabulator: 801 Batch: 44

Poll ID: 317 Ballot ID: 676

President of the United States

Donald J. Trump (I) (Rep)

US Senate (Perdue)

David A. Perdue (I) (Rep)

US Senate (Loeffler) - Special

Doug Collins (Rep)

Public Service Commission District 1

Jason Shaw (I) (Rep)

Public Service Commission District 4

Lauren Bubba McDonald, Jr. (I) (Rep)

US House District 6

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FULTON

OFFICE

GENERAL AND

OF THE STATE

NOVEMBER

*"I understand that the offer or acceptance of money on a  
list of candidates, issue, or list of issues included in  
under Georgia law." [O.C.G.A. 2-2-1]*

779-RW01





00801\_00044\_000042.tif scanned at: 18:59:10 on 12/01/20.

Scanned on: ICC Tabulator: 801 Batch: 44

Poll ID: 317 Ballot ID: 676

President of the United States

Donald J. Trump (I) (Rep)

US Senate (Perdue)

David A. Perdue (I) (Rep)

US Senate (Loeffler) - Special

Kelly Loeffler (I) (Rep)

Public Service Commission District 1

Jason Shaw (I) (Rep)

Public Service Commission District 4

Lauren Bubba McDonald, Jr. (I) (Rep)

US House District 6

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**OFFICIAL ABSE**  
**OFFICIAL**

**INSTRUCTIONS:**

To Vote

- 1. Use black or blue ink to mark the ballot
- 2. Completely fill in the empty oval to the all races you wish to vote
- 3. If voting for a Write-In candidate, complete the Write-In selection, then write the name provided

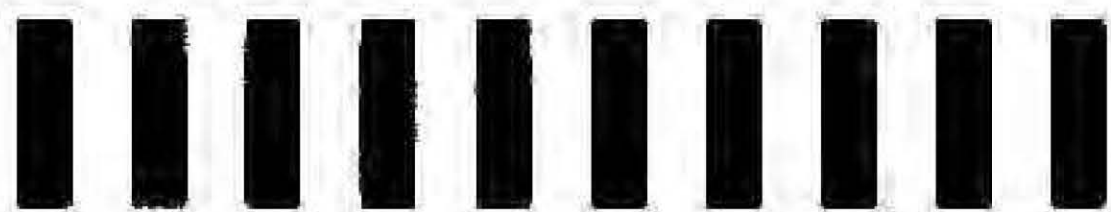
If you make a mistake or change your

- A. Do not attempt to mark through the seal
- B. Mail or return the spoiled ballot and envelope

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**For State Representative  
In the General Assembly From  
48th District  
(Vote for One)**

- Betty Price**  
Republican
- Mary Robichaux**  
(Incumbent) Democrat
- 

**Write-in**

**For District Attorney of the  
Atlanta Judicial Circuit  
(Vote for One)**

05160\_00074\_000023.tif scanned at: 13:01:06 on 11/30/20.

Scanned on: ICC Tabulator: 5160 Batch: 74

Poll ID: 317 Ballot ID: 676

President of the United States

Donald J. Trump (I) (Rep)

US Senate (Perdue)

David A. Perdue (I) (Rep)

US Senate (Loeffler) - Special

Doug Collins (Rep)

Public Service Commission District 1

Jason Shaw (I) (Rep)

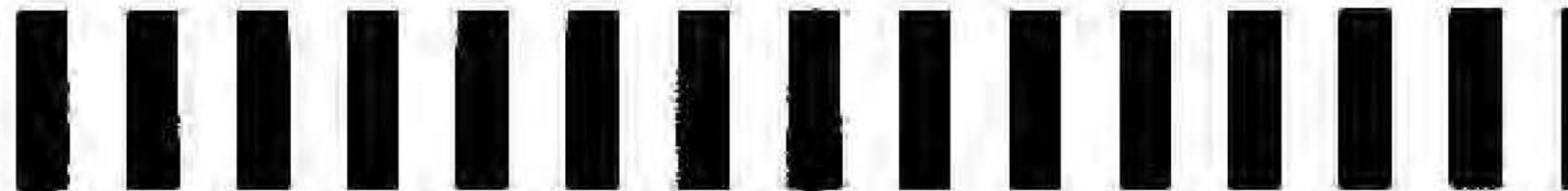
Public Service Commission District 4

Lauren Bubba McDonald, Jr. (I) (Rep)

US House District 6

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FULTON

**OFFICIAL ABSENTEE/PRESIDENTIAL**

**OFFICIAL GENERAL ELECTION**

**OF THE STATE OF DELAWARE**

**NOVEMBER 3, 2020**

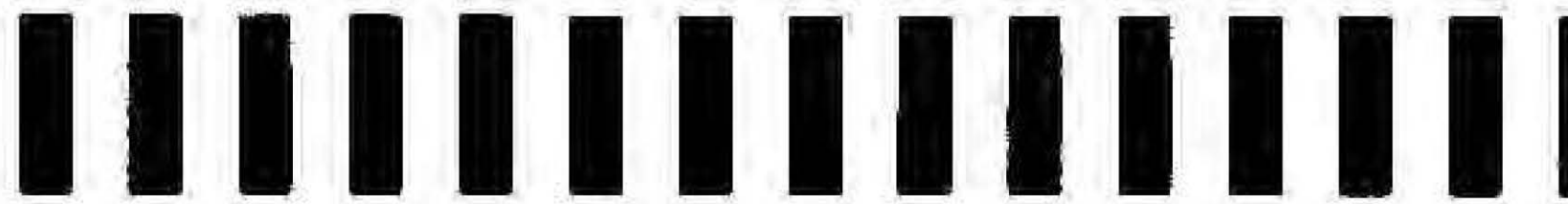
**INSTRUCTIONS:**

**To Vote**

- 1. Use black or blue ink to mark the ballot**
- 2. Completely fill in the empty oval to the left of the candidate or party for all races you wish to vote.**

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**For State Representative  
In the General Assembly From  
48th District  
(Vote for One)**

- Betty Price**  
Republican
- Mary Robichaux**  
(Incumbent) Democrat
- 

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**Authorizes  
taxes to the  
general stat**

House Resolu  
Act No. 597

00794\_00017\_000024.tif scanned at: 12:40:00 on 12/02/20.

Scanned on: ICC Tabulator: 794 Batch: 17

Poll ID: 317 Ballot ID: 676

President of the United States

Donald J. Trump (I) (Rep)

US Senate (Perdue)

David A. Perdue (I) (Rep)

US Senate (Loeffler) - Special

Kelly Loeffler (I) (Rep)

Public Service Commission District 1

Jason Shaw (I) (Rep)

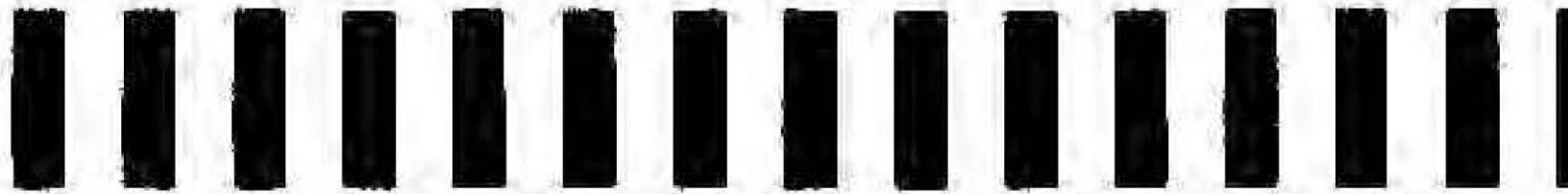
Public Service Commission District 4

Lauren Bubba McDonald, Jr. (I) (Rep)

US House District 6



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# OFFICIAL ABSENTEE/PRO

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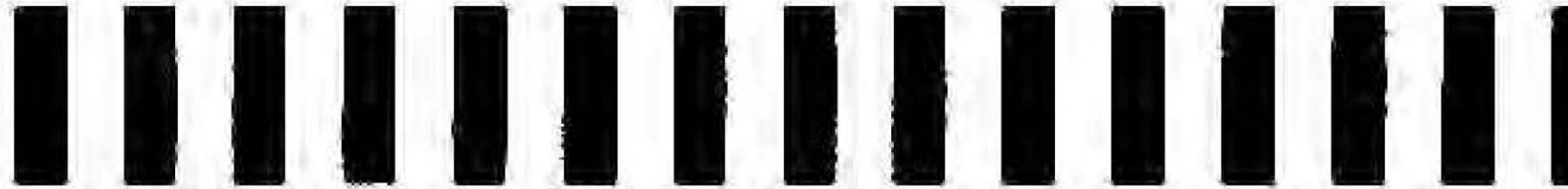
### INSTRUCTIONS:

#### To Vote

1. Use black or blue ink to mark the ballot
2. Completely fill in the empty oval to the left of the candidate  
all cases you wish to vote

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**For State Representative  
In the General Assembly From  
48th District  
(Vote for One)**

- Betty Price**  
Republican
- Mary Roblchaux**  
(Incumbent) Democrat
- 

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**Authorizes  
taxes to the  
general stat**

House Resolu  
Act No. 507

00794\_00017\_000029.tif scanned at: 12:40:03 on 12/02/20.

Scanned on: ICC Tabulator: 794 Batch: 17

Poll ID: 317 Ballot ID: 676

President of the United States

Joseph R. Biden (Dem)

US Senate (Perdue)

Jon Ossoff (Dem)

US Senate (Loeffler) - Special

Raphael Warnock (Dem)

Public Service Commission District 1

Robert G. Bryant (Dem)

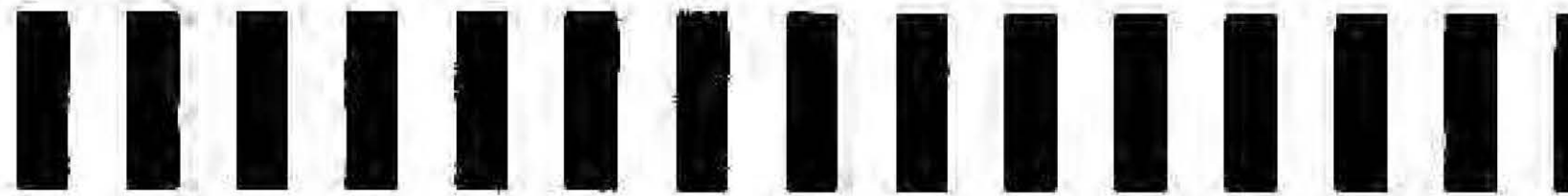
Public Service Commission District 4

Daniel Blackman (Dem)

US House District 6

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# OFFICIAL ABSENTEE/PRO

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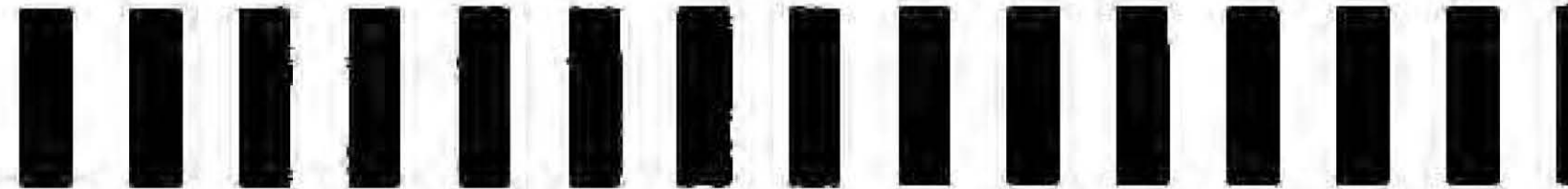
### INSTRUCTIONS:

#### To Vote

1. Use black or blue ink to mark the ballot
2. Completely fill in the empty oval to the left of the candida  
all space you wish to vote

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**For State Representative  
 In the General Assembly From  
 48th District  
 (Vote for One)**

- Betty Price**  
Republican
- Mary Robichaux**  
(Incumbent) Democrat
- 

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**Authorizes  
taxes to the  
general stat**

House Resolu  
Act No. 597

00794\_00018\_000001.tif scanned at: 12:43:08 on 12/02/20.

Scanned on: ICC Tabulator: 794 Batch: 18

Poll ID: 317 Ballot ID: 676

President of the United States

Joseph R. Biden (Dem)

US Senate (Perdue)

Jon Ossoff (Dem)

US Senate (Loeffler) - Special

Raphael Warnock (Dem)

Public Service Commission District 1

Robert G. Bryant (Dem)

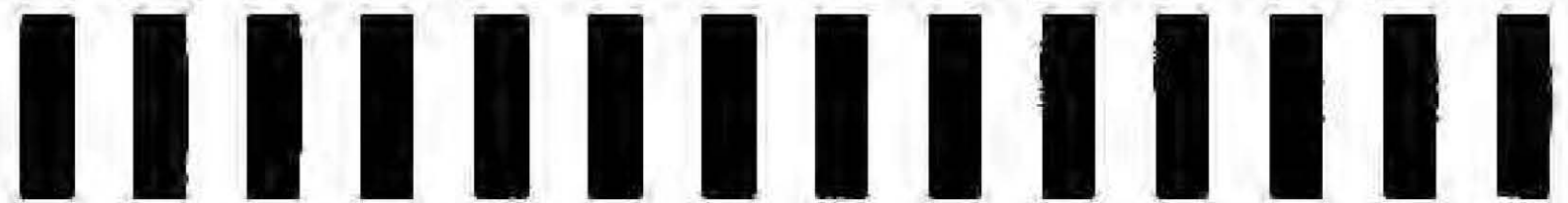
Public Service Commission District 4

Lauren Bubba McDonald, Jr. (I) (Rep)

US House District 6

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# OFFICIAL ABSENTEE/PROXY

## OFFICIAL GENERAL ELECTION OF THE STATE OF NOVEMBER 3, 2020

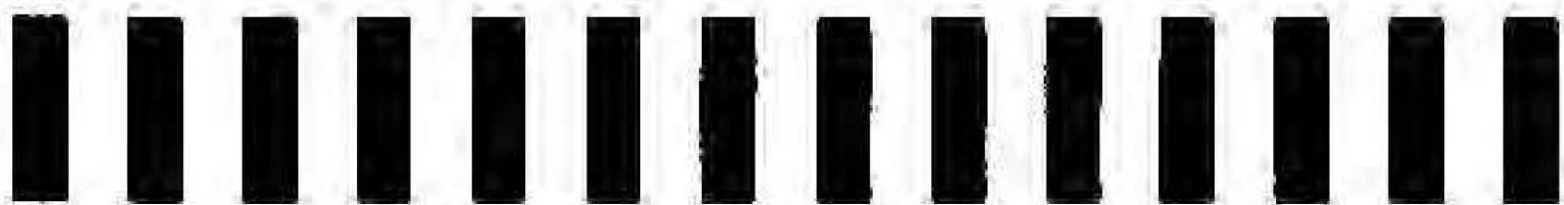
### INSTRUCTIONS:

#### To Vote

1. Use black or blue ink to mark the ballot
2. Completely fill in the empty oval to the left of the candidate's name

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**For State Representative  
In the General Assembly From  
48th District  
(Vote for One)**

- Betty Price**  
Republican
- Mary Robichaux**  
(Incumbent) Democrat
- 

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**Authorizes  
taxes to the  
general stat**

House Resolu



00794\_00018\_000011.tif scanned at: 12:43:15 on 12/02/20.

Scanned on: ICC Tabulator: 794 Batch: 18

Poll ID: 317 Ballot ID: 676

President of the United States

Joseph R. Biden (Dem)

US Senate (Perdue)

Jon Ossoff (Dem)

US Senate (Loeffler) - Special

Raphael Warnock (Dem)

Public Service Commission District 1

Robert G. Bryant (Dem)

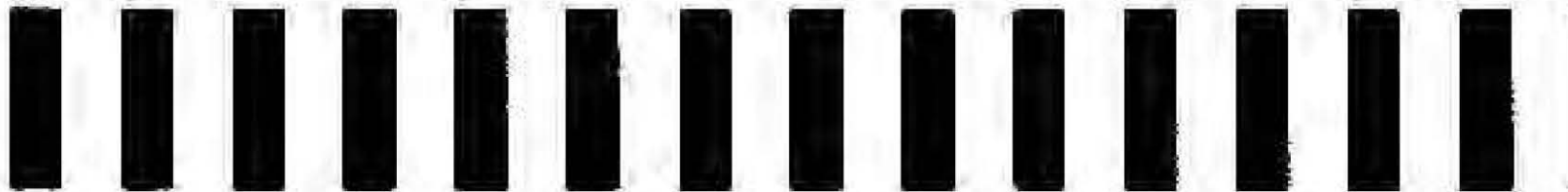
Public Service Commission District 4

Daniel Blackman (Dem)

US House District 6

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# OFFICIAL ABSENTEE/PROXY

## OFFICIAL GENERAL ELECTION OF THE STATE OF NOVEMBER 3, 2020

### INSTRUCTIONS:

#### To Vote

1. Use black or blue ink to mark the ballot
2. Completely fill in the empty oval to the left of the candidate's name for all races you wish to vote.

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**For State Representative  
In the General Assembly From  
48th District  
(Vote for One)**

- Betty Price**  
Republican
- Mary Robichaux**  
(Incumbent) Democrat
- 

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**Authorizes  
taxes to the  
general stat**

House Resolu  
Act No. 597

00794\_00019\_000002.tif scanned at: 12:44:48 on 12/02/20.

Scanned on: ICC Tabulator: 794 Batch: 19

Poll ID: 317 Ballot ID: 676

President of the United States

Donald J. Trump (I) (Rep)

US Senate (Perdue)

David A. Perdue (I) (Rep)

US Senate (Loeffler) - Special

Doug Collins (Rep)

Public Service Commission District 1

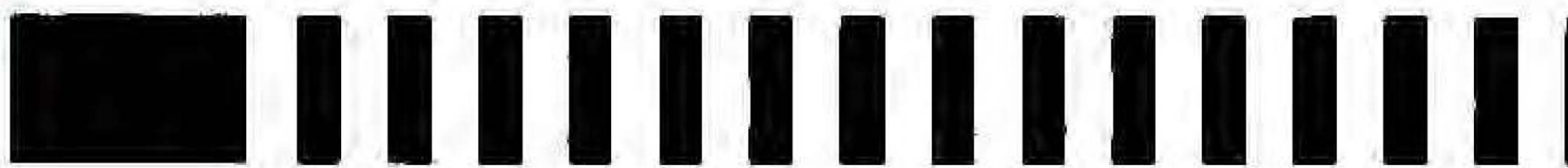
Jason Shaw (I) (Rep)

Public Service Commission District 4

Lauren Bubba McDonald, Jr. (I) (Rep)

US House District 6

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FULTON

# OFFICIAL ABSENTEE/PRESIDENTIAL

## OFFICIAL GENERAL ELECTION OF THE STATE OF GEORGIA NOVEMBER 3, 2020

### INSTRUCTIONS:

#### To Vote

1. Use black or blue ink to mark the ballot
2. Completely fill in the empty oval to the left of the candidate's name in all spaces you wish to vote.

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**For State Representative  
In the General Assembly From  
48th District  
(Vote for One)**

- Betty Price**  
Republican
- Mary Robichaux**  
(Incumbent) Democrat
- 

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**Authorizes  
taxes to the  
general stat**

House Resolu  
Act No. 597

00794\_00019\_000005.tif scanned at: 12:44:51 on 12/02/20.

Scanned on: ICC Tabulator: 794 Batch: 19

Poll ID: 317 Ballot ID: 676

President of the United States

Donald J. Trump (I) (Rep)

US Senate (Perdue)

David A. Perdue (I) (Rep)

US Senate (Loeffler) - Special

Kelly Loeffler (I) (Rep)

Public Service Commission District 1

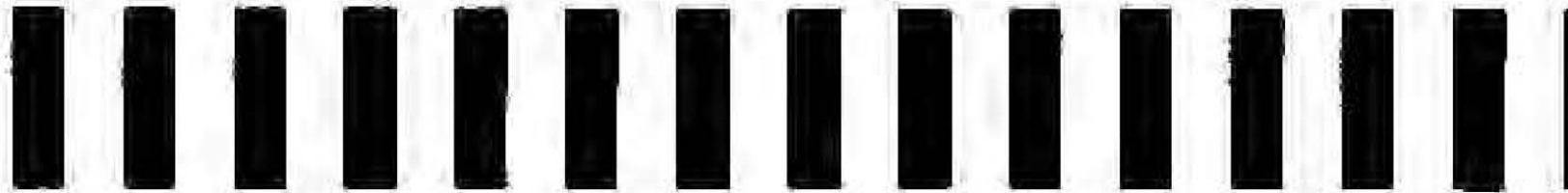
Jason Shaw (I) (Rep)

Public Service Commission District 4

Lauren Bubba McDonald, Jr. (I) (Rep)

US House District 6

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FULT

# OFFICIAL ABSENTEE/PROXY

## OFFICIAL GENERAL ELECTION OF THE STATE OF NOVEMBER 3, 2020

### INSTRUCTIONS:

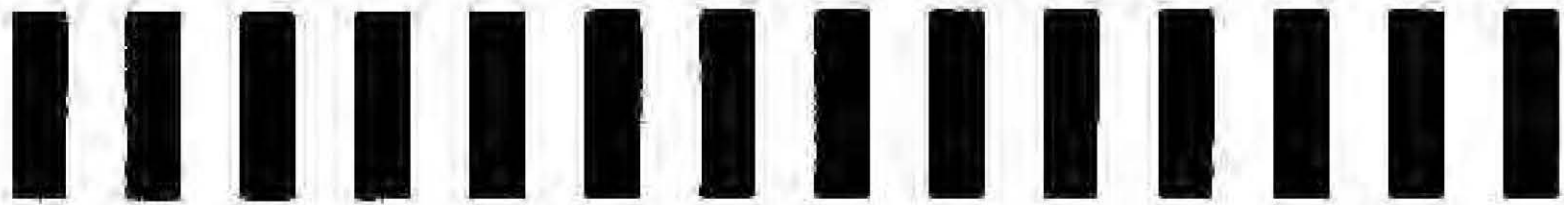
#### To Vote

1. Use black or blue ink to mark the ballot
2. Completely fill in the empty oval to the left of the candidate's name. If you wish to vote for more than one candidate, fill in all spaces you wish to vote.



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**For State Representative  
In the General Assembly From  
48th District  
(Vote for One)**

**Betty Price**  
Republican

**Mary Robichaux**  
(Incumbent) Democrat

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**Authorizes  
taxes to the  
general stat**

House Resolu  
Act No. 597

00794\_00019\_000006.tif scanned at: 12:44:52 on 12/02/20.

Scanned on: ICC Tabulator: 794 Batch: 19

Poll ID: 317 Ballot ID: 676

President of the United States

Donald J. Trump (I) (Rep)

US Senate (Perdue)

David A. Perdue (I) (Rep)

US Senate (Loeffler) - Special

Kelly Loeffler (I) (Rep)

Public Service Commission District 1

Jason Shaw (I) (Rep)

Public Service Commission District 4

Lauren Bubba McDonald, Jr. (I) (Rep)

US House District 6

# **APPENDIX 9**

