



California Election Infrastructure: Making a Good System Better

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Milton Marks Commission on California State
Government Organization and Economy

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Dedicated to Promoting Economy and Efficiency in California State Government

The Little Hoover Commission, formally known as the Milton Marks "Little Hoover" Commission on California State Government Organization and Economy, is an independent state oversight agency.

By statute, the Commission is a bipartisan board composed of five public members appointed by the governor, four public members appointed by the Legislature, two senators and two assemblymembers.

In creating the Commission in 1962, the Legislature declared its purpose:

...to secure assistance for the Governor and itself in promoting economy, efficiency and improved services in the transaction of the public business in the various departments, agencies and instrumentalities of the executive branch of the state government, and in making the operation of all state departments, agencies and instrumentalities, and all expenditures of public funds, more directly responsive to the wishes of the people as expressed by their elected representatives...

The Commission fulfills this charge by listening to the public, consulting with the experts and conferring with the wise. In the course of its investigations, the Commission typically empanels advisory committees, conducts public hearings and visits government operations in action.

Its conclusions are submitted to the Governor and the Legislature for their consideration. Recommendations often take the form of legislation, which the Commission supports through the legislative process.

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Letter from the Chair

April 19, 2021

The Honorable Gavin Newsom
Governor of California

The Honorable Toni Atkins
Speaker pro Tempore of the Senate
and members of the Senate

The Honorable Anthony Rendon
Speaker of the Assembly
and members of the Assembly

The Honorable Scott Wilk
Senate Minority Leader

The Honorable Marie Waldron
Assembly Minority Leader

DEAR GOVERNOR AND MEMBERS OF THE LEGISLATURE:

California's elections are free, fair, and secure but the state must not be complacent. The Commission found that California currently relies on a for-profit model of developing election infrastructure and its limitations leave equipment designers and manufacturers without the financial incentive to create security upgrades for existing models. Furthermore, the Commission found that some counties are left to rely on outdated post-election audits when there is a better, more statistically rigorous auditing alternative available.

In order to address these challenges and further improve the security of California's election infrastructure, the Commission recommends that the state invest in and adopt an open source elections system, implement risk-limiting audits, improve training of election officials, and adopt the use of compliance audits. California must build on its good work to make our voting even more secure.

The Commission respectfully submits this work and stands prepared to help you address this challenge.

Sincerely,

Pedro Nava, Chair
Little Hoover Commission

■ Executive Summary

California's elections are free, fair, and secure. As technology and knowledge evolve, however, the state can take steps to improve its election infrastructure. California should adopt an open source elections system, require the use of "risk-limiting audits" as soon as funding allows, improve the training of election officials, and delineate standards for compliance audits.

The Commission held a hearing on this topic in 2018 and in 2019 released a letter to the Governor and legislative leadership to consider important questions related to election security, such as the need for funding to improve equipment.

This report builds on the Commission's past work and adds specific policy recommendations. The Commission outlines potential improvements in four broad areas of election security:

Open Source Elections System

The state currently relies on for-profit producers of election equipment. An open source system would be more transparent, save money, increase versatility for counties, and align with a state goal to use open source software across government.

Such a system must be accompanied by policies to ensure its proper use, and its adoption must not be rushed.

The Commission recommends that the state invest in a publicly owned, open source elections system.

Risk-Limiting Audits

The state's current requirement for a manual tally of 1 percent of precincts as a way to check results is outdated. It does not require all types of ballots to be audited; it does not require scrutiny of close races; and it does not ensure that an incorrect result will be corrected.

There is an alternative: a "risk-limiting audit." Such an audit reviews randomly selected ballots until the risk limit – a pre-determined chance that a wrong outcome will not be discovered – is reached. These audits have a high chance of correcting a previous count that is wrong.

However, risk-limiting audits might increase costs for counties.

The Commission recommends that the state require risk-limiting audits as soon as needed funding is available.

Training

Most chief election officials have many duties, and thus have vastly different levels of expertise in elections administration. Additionally, elections rely on thousands of relatively inexperienced poll workers. Often it is difficult for county election officials to find enough poll workers.

The Commission recommends that the state create a training program for county elections officers and for lower-level elections workers. The state should also create incentives for people to become poll workers. The Secretary of State should provide staff to jurisdictions that lack enough trained poll workers.

Compliance Audits

California's elections code outlines security procedures, but lacks any system to ensure compliance.

The Commission recommends that the state create a framework for mandatory compliance audits.

■ Introduction

The Most Secure Election in History

California's elections are free, fair, and secure. The nonprofit news organization CalMatters surveyed county election officials and found that the November 2020 election had "few glitches [and] little drama."¹ Californians turned out in rates not seen since Eisenhower was elected.² This was true despite the fact that the election occurred during a worldwide pandemic, which at the time of publication had infected 3.5 million and killed more than 55,000 Californians.³ Every voter was provided a mail ballot, and unspent funds originally intended to upgrade election system infrastructure were rerouted to keep voters safe while voting.

Despite this striking success, California can improve its elections. As technology and statistical knowledge change, new systems can make our voting even more secure. This report focuses principally on two changes: the use of an open source elections system and the implementation of risk-limiting audits.

An Open Source Elections System

The limitations of a for-profit model of developing election infrastructure in California are straightforward. The customer base is tiny: There are only 58 potential customers who historically have only purchased new voting equipment every couple of decades. The cost to sell in California is high: California does not charge applicants a fee for certification, but equipment manufacturers are expected to cover the costs of the process, which is extensive. Manufacturers who update their systems must re-complete the testing and certification process. The Secretary of State's office's overview of what that entails can be found on page 5.⁴

Consequently, equipment designers and manufacturers do not have large research and development budgets, nor the financial incentive to create security upgrades for existing models. The service and support side of the industry is where they make their money.⁵ As a result, voters vote on machines that meet the security standards of the year they were certified.

Incentivizing Security through Open Source Intellectual Property

Experts recommend investing in and utilizing open source intellectual property, though the state would need to create a governance framework.

There are different models of open source systems, and the model election experts often recommend may be familiar to many in the IT industry as a shared source system. This means that the source code is freely available for anyone to inspect, but only authorized individuals may change the code. The "shared source" nomenclature is closely associated with a type of licensing by a software company, however, so some, including the Commission, use the broader "open source" terminology to prevent confusion. Any open source system adopted by California, then, would be available to security researchers, "white hat" hackers who try to exploit a system so they can report security concerns, students, election officials, and anyone else interested, while only the Secretary of State's office or its designee would be able to modify the code.

Currently, open source applications typically involve the software that manages election systems or individual components within it.⁶ The Department of Defense, however, currently is working on open source election hardware, which would protect itself against security threats such as users who try to tamper with the equipment.⁷

Review and Testing for Certification Process Overview For Voting Systems and Remote Accessible Vote By Mail Systems



California Secretary of State. January 13, 2017. "Review and Testing for Certification Process Overview For Voting Systems and Remote Accessible Vote By Mail Systems." <https://votingsystems.cdn.sos.ca.gov/cert-and-approval/review-testing-overview.pdf>.

Benefits of an Open Source System

There are several benefits to the state investing in and utilizing open source election systems:

- **It's more transparent.** If we want elections to be transparent, said UC Davis computer security professor and researcher Matt Bishop, then people should be able to see how their votes are counted.⁸
- **Transparency promotes security.** To the layperson, allowing anyone to look at source code seems like a gift to hackers instead of a security measure. However, the opposite approach, called security through obscurity, does not work. In that case, the technology owners, their testers, and malicious actors are the only ones with eyes on the source code, and the latter are not likely to alert anyone to security weaknesses. Since no technology is unhackable, no matter how talented and conscientious its designers, more review of

the source code means more opportunities to correct security flaws before they impact elections.

Switzerland provides a case in point. Swiss Post, which oversees the country's election infrastructure, worked with an outside contractor to develop a new elections system, employed professional auditors to review the code, then launched resilience testing with pre-approved testers from the public. Colloquially referred to as bug bounties, resilience testing provides financial incentives to "white hat" hackers to find and report flaws in the code back to the organization, often with terms limiting how public these testers can make their findings. A whistleblower leaked the source code for Switzerland's system to the general public. Security researchers were appalled by what they found.

Within the "poorly constructed and convoluted maze that made it difficult to follow what was going on in the system and effectively evaluate whether security measures deployed in the system were done properly," researchers discovered a serious flaw: A malicious actor with access to Swiss Post's IT system (i.e. an insider) could replace all the ballots in the system without detection and change the reported election outcome.⁹ The takeaway is that at the end of a strenuous testing process, such a critical flaw was missed by developers and auditors and was only detected through a public, albeit illegal, review of the source code.¹⁰

- **It is cheaper.** California counties have twice updated their election equipment since the 2000 general election at a cost of about \$600 million. Witnesses testified that designing, testing, and training election officials on an open source publicly-owned election technology platform would cost about \$40 to \$50 million.¹¹ Counties would then be responsible for the cost of the hardware and set-up, and could contract with vendors for maintenance and support if it would

be more efficient than doing it themselves.¹² There would be costs associated with updating and maintaining a publicly-owned open source system, but we believe those costs would be less than the current cost of updating a proprietary system. In an open source system, California would remove some of those expenses from the counties while promoting better security and ultimately saving money.

- **It is versatile.** An open source system would allow counties to structure the acquisition and support of their election infrastructure in a way that benefits them. Counties with significant IT resources, like Los Angeles and San Francisco, would be able to continue creating and managing their own voting system. Counties with fewer resources would have the flexibility to work with vendors on hardware, service, and support packages. The goal is not to put equipment vendors out of business; rather, it is to improve security by providing an alternative to the part of the industry where the invisible hand leads to insecurity.
- **It aligns with state goals.** California has committed to implementing open source software across state government. The Department of Technology asks state agencies to use open source software when possible and to make their custom code available as open source when practical to decrease duplicative costs, reduce vendor lock-in, improve security, and facilitate information sharing.¹³

Recommendation

1. The State of California should invest in a publicly-owned, open source elections system designed to be accessible, secure, reliable, and auditable. Open source should mean that security researchers and other interested parties should be able to test the code and report vulnerabilities to the state. This system should be designed to provide maximum flexibility for the different needs of different counties.

- As part of the development of open source election infrastructure, California should create a policy framework governing how the system should be used to maximize the benefits of adopting this system.
- Election officials should resist pressure to use open source systems in elections until the code has been released and inspected and the equipment is functioning as intended.

Risk-Limiting Audits

The 1 Percent Manual Tally

California counties currently conduct post-election audits called the 1 percent manual tally. In these audits, election officials randomly select 1 percent of participating precincts and review the ballots cast in those precincts to ensure the paper record matches reported results.¹⁴ Though innovative when first implemented in 1965, there are some shortfalls to the manual tally:

- **It does not require all types of ballots to be audited.** Election officials are not required to include provisional ballots in their tally, nor are they required to include vote-by-mail ballots that are properly postmarked but have not arrived before Election Day. The number of excluded ballots is significant: More than 970,000 of the 12.7 million ballots cast in the November 2018 election were provisional.¹⁵ Having such large categories of ballots that are not required to be audited leaves big holes in California’s election security net.
- **It does not require scrutiny of close races.** Election officials stop auditing when they’ve completed 1 percent of participating precincts. If auditing shows that a very tight race is even tighter than previously thought or there were errors in a close race, auditors still stop at 1 percent. If a candidate or member of the public has concerns about accuracy in a tight race, they can request a

recount, but they must pay for it.¹⁶

- **It does not guarantee election officials will catch and correct errors.** If auditors find a discrepancy between how voters voted and how their votes were recorded or reported, there is no mechanism in place to fix the outcome.¹⁷ Changing election results in California requires a recount, which someone must be willing to pay for. In effect, the requirement for a 1 percent manual tally is useful only as a warning siren that there may be a problem with the original count. But if no one is willing to pay for a recount, nothing happens.

The exclusion of so many ballots from the process and lack of follow-up requirements led Dr. Philip Stark, UC Berkeley associate dean for mathematical and physical sciences and expert on election auditing, to testify that California’s manual tally, “wastes resources, and does not accomplish anything in particular.”¹⁸

An Alternative: Risk-Limiting Audits

Statistical methodology has advanced since 1965 and there are other auditing options available with fewer shortcomings than the manual tally. Risk-limiting audits in particular are a statistically rigorous alternative.

WHAT IS A RISK-LIMITING AUDIT?

A risk-limiting audit is a review of randomly-selected ballots until the risk limit – the chance that a wrong outcome will not be discovered and corrected in the audit¹⁹ – is reached. For example, wrote Dr. Stark and his colleague, political scientist Mark Lindeman, a risk limit of 10 percent means that if the reported outcome is wrong, there is at most a 10 percent chance that the audit will not correct the outcome and at least a 90 percent chance that it will.²⁰ In other words, risk-limiting audits provide another layer of protection against a wrong outcome. They do not

guarantee the reported outcome is right, stated Dr. Stark and Dr. Lindeman, but with a low risk limit they have a large chance of correcting the outcome if wrong.²¹

The chart on page 9 outlines the process of conducting a risk-limiting audit. First, the election jurisdiction must settle on the audit's risk limit. A risk limit of 5 percent often is chosen, meaning there is no more than a 5 percent chance that wrongly-reported results would not be corrected. Then the ballots to be audited must randomly be selected. All counties in California must create a manifest detailing the physical location of every ballot cast in the election, so one way of choosing ballots would be to randomly select (using methods proven to produce random results) positions on the manifest – say 27, 441, and 10,297, then pull the ballots corresponding to those positions. If Candidate A was reported to have won by a landslide and the randomly-selected ballots reflected that voters indeed overwhelmingly voted for that candidate, then not too many ballots would have to be audited to be sure there is only a 5 percent chance that a wrong outcome went uncorrected. However, if Candidate A was reported to have won by a landslide and randomly-selected ballots showed many people voted for Candidate B, auditors would have to keep examining ballots until they reached the risk limit.

HOW RISK-LIMITING AUDITS ADDRESS THE 1 PERCENT MANUAL TALLY'S SHORTCOMINGS

Risk-limiting audits solve some of the shortcomings of the current auditing system. If a race is very close or the audit catches errors, election officials will have to examine more ballots to be sure of an accurate outcome. If necessary, this could result in a manual examination of 100 percent of ballots. This solves the problem of remedying an incorrect outcome in the initial count, provided Legislators give a full hand count the same legal significance as a recount. Under the manual tally, officials stop auditing after 1 percent of precincts and report the outcome in their

certification of election results. If it looks like there might be a problem, anyone can ask and pay for a recount. In a risk-limiting audit, the recount is built into the auditing system before the final certification of election results.

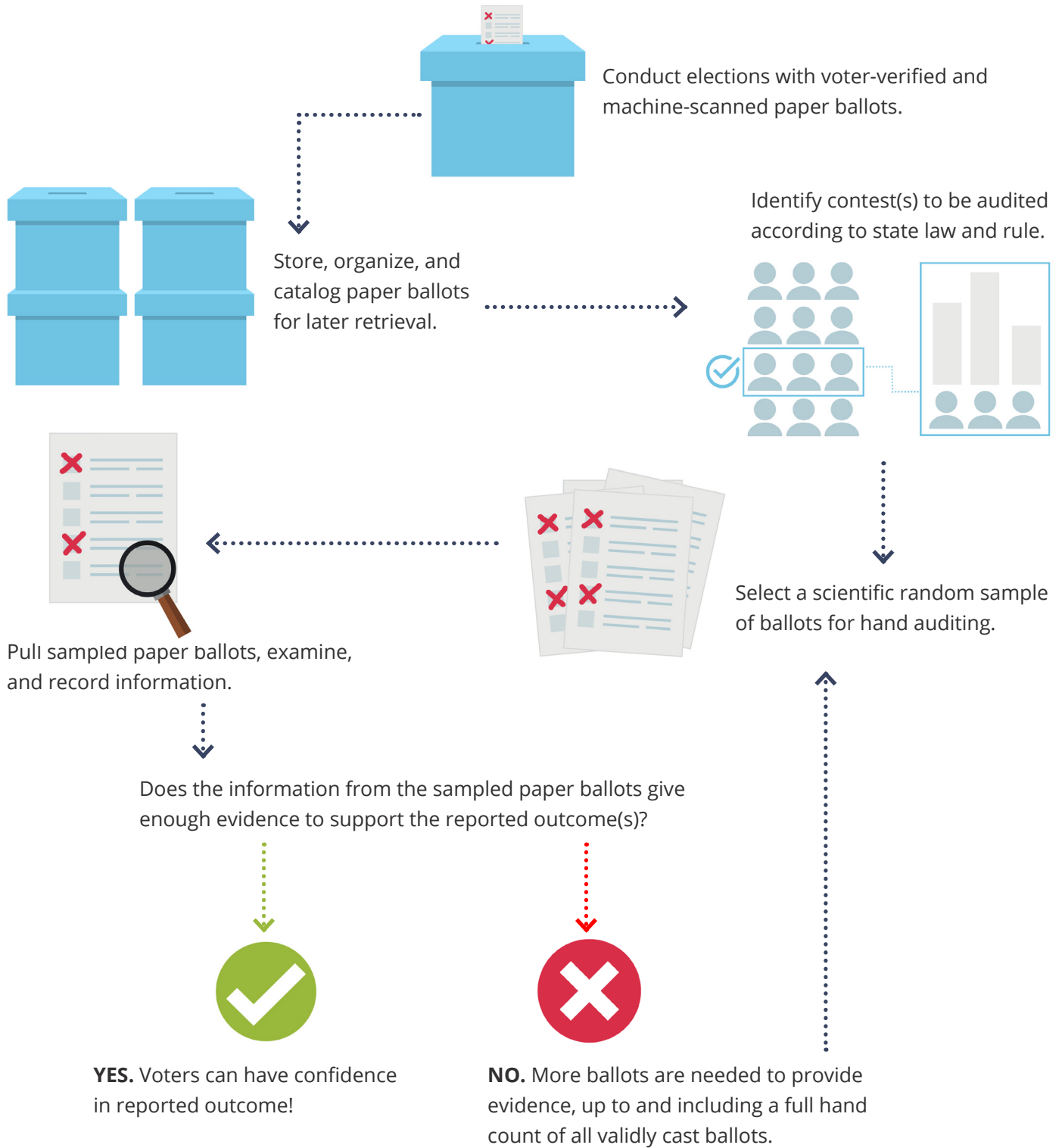
Voluntary Risk-Limiting Audits for Upcoming Elections

In 2018, the Legislature passed and the Governor signed AB 2125 (Quirk), which allowed counties to voluntarily conduct a risk-limiting audit in lieu of the manual tally for elections in 2020.²² The legislation also required the Secretary of State to design a regulatory framework for risk-limiting audits that included all ballots, including provisional and vote-by-mail ballots. In August 2020, the option to conduct risk-limiting audits was extended through the end of 2022 through AB 2400 (Quirk), which also provided counties added flexibility in the contests they audit.²³

This legislation was a strong step forward, but California must now go further and require counties to conduct risk-limiting audits. There is abundant evidence that risk-limiting audits work. Risk-limiting audit pilot programs have been conducted in California since 2010, when the federal Election Assistance Commission awarded grants to the state for that purpose.²⁴ Pilot audits have been completed in a diverse array of counties, including Inyo, Alameda, Humboldt, and San Luis Obispo. The Commission is confident that additional voluntary risk-limiting audits conducted under AB 2125 and AB 2400 will continue to show the advantages of this system.

No one doubts that risk-limiting audits are sounder statistically than the 1 percent manual tally. It is time to ensure that all California counties – and thus all California voters – employ the best election auditing system that is available.

Risk-Limiting Audits



Source: Verified Voting. "A Verified Voting Flowchart for Conducting Risk-Limiting Audits." July 2018. <https://verifiedvoting.org/publication/a-verified-voting-flowchart-for-conducting-risk-limiting-audits/>.

Challenges in Implementing Risk-Limiting Audits

Election officials' concerns about risk-limiting audits revolve around resources and funding. A large hand count would present a significant logistical challenge in heavily-populated counties like Los Angeles: There could be millions of ballots cast and in a risk-limiting audit, election officials must find specific ballots, whereas ballots can be audited by batch in the 1 percent manual tally.²⁵ Some officials support the idea of machine-assisted audits: Kenneth Bennett, who oversaw the Voting Solutions for All People program in Los Angeles County, testified that, "a 100% manual recount is not only a time-consuming logistical challenge requiring hundreds of staff resources, it is questionable that such a hand count of 2 to 3 million ballots would be demonstrably more accurate than the machine-tallied results."

Proving with better accuracy that the reported results of an election are correct is worth the cost for the legitimacy it adds to elections, particularly in an era of misinformation.

Incorporating another piece of technology in the auditing process would add another security risk, however, and negate the purpose for the risk-limiting audit: to see if machines tallied and reported votes correctly. The potential logistical enormity, however, is not lost on the Commission.

Others testified that it was unlikely a 100 percent hand count would be required unless there was an exceptionally close race or serious errors in the voting process. On the contrary, if things run smoothly, it is likely that fewer ballots would need to

be audited under a risk-limiting audit system than the manual tally.

Pilot projects have borne this out. For a 2018 special election, Inyo County election officials conducted both a risk-limiting audit and a manual tally. With a 10 percent risk limit, the risk-limiting audit required reviewing 19 ballots while the manual tally required auditing 74 ballots.²⁶ In a November 2018 Orange County pilot project for three local contests, officials anticipated a sample size of 16,000 ballots for the combined three contests would be needed to meet their confidence level, versus the more than 57,000 ballots that would need to be reviewed for the manual tally. For one of the three contests, the confidence level was met after auditing only 540 ballots. Auditors unfortunately had to stop reviewing ballots beyond 1,000 each for the other two contests, because the staff were needed for the manual tally. More than 60 employees spent three weeks auditing the 57,178 ballots required under the 1 percent manual tally. Dr. Stark, who worked with Orange County on this project, testified that unless there were errors or a too-close-to-call race, the number of ballots required by a risk-limiting audit even in highly-populated counties would be relatively few.²⁷

Supporting Best Practices

It is inevitable that there will be errors or very close races, and in those instances having to audit large numbers of ballots is a feature, not a flaw. California must provide the support necessary to prove the accuracy of results or remedying mistakes. Past history has taught county election officials that the costs of implementing a new system will be their problem. The state must rectify that. Often, a risk-limiting audit will require fewer resources than the manual tally, though it would be a new cost to the state due to funded mandate requirements. Proving with better accuracy that the reported results of an election are correct is worth the cost for the legitimacy it adds to elections, particularly

in an era of misinformation. The Commission is cognizant of current fiscal conditions, but California should require risk-limiting audits statewide and be prepared to fund that mandate as soon as the budget allows. The system should build in additional support and flexibility in case an extremely close election requires a manual review of a significant number of ballots.

Recommendation

2. Risk-limiting audits should be conducted to verify all election results. This could be done by the state directly or through a mandate to counties. The change should be implemented as soon as the state can provide the needed funding either to the Secretary of State's office or to mandated counties.

- Should a risk-limiting audit result in a 100 percent manual inspection of the ballots, the Legislature should award that hand count the same legal significance as an official recount.

Other Reforms

The state can also improve training and adopt the use of compliance audits.

Top-Tier Training

From the county election chief to the volunteer poll worker, an accurate election outcome depends on everyone being fluent in their job responsibilities, prepared for security threats, and knowledgeable about election policies and procedures.

Training Starts at the Top

Most election administrators in California have many duties. Counties often lump election administration in with the registrar's or a similar position's duties.

Commission witnesses stressed the need to provide election officers with comprehensive security training. Dr. Bishop recommended to staff

that California undertake a needs assessment to understand the gaps between state security standards and how the standards are implemented by local election officials. Then a training course or curriculum could be developed to fill those gaps.²⁸ The state's involvement is critical, as county budgets can only go so far. Commission witness Kammi Foote, for example, heads Inyo County's election office, and also serves as the county's recorder and registrar. Her combined annual budget for all three divisions at the time of the hearing was approximately \$500,000, with about \$60,000 allocated for elections.²⁹ There was not much left over for extensive security training.

Training Must Not Stop at the Top

Aside from county election officials and their staff, elections rely on tens of thousands of relatively inexperienced poll workers.

California election workers must meet a basic set of standards, but it is up to counties to package training options that help their election workers reach those standards. In many counties, this is a one-time class plus optional hands-on time with the county's voting equipment. "Being a poll worker is complicated," Stanford emeritus professor and founder of Verified Voting David Dill told staff. He observed that many poll workers are not taught the reasons behind the procedures they must follow and consequently do not understand how a procedure protects against threats. It's easier to take shortcuts, intentionally or accidentally, when election workers do not understand the purpose of what they're doing. And California has no systemic way of monitoring what is happening on the ground.³⁰

CREATING INCENTIVES FOR PEOPLE TO BECOME ELECTION WORKERS

The obvious solution seemingly is more training for election workers, but the answer is not that simple. Putting aside cost, officials already have a hard time

finding enough election workers. Poll workers are paid little, must work on a weekday, and in many cases must take time off from jobs or school. Two-thirds of local election officers nationwide report finding it difficult to staff their polls.³¹

Adding further requirements without creating corresponding incentives would only make it harder to recruit election workers. The state must create incentives to encourage people to sign up to be an election worker with additional enhanced training. California should consider:

- Granting counties funds to supplement base pay in areas that have historically struggled to find election workers.
- Working with high schools and colleges to create election administration courses for credit in election years and requiring the students to serve as poll workers as part of the curriculum, which should include enhanced training. Poll workers should continue to be paid to avoid limiting the opportunity to students who can afford an unpaid internship. Election officials should be able to waive the minimum GPA requirement at their discretion if a consultation with the student indicates that the student's participation would be mutually beneficial.
- Allowing the state's 233,000 employees to complete enhanced training without having to use their vacation time, just as California already does for employees who serve as election workers. Additionally, department heads should actively encourage interested employees to become election workers.

Finally, if a county does not have enough trained election workers to administer a secure and accessible election, then the Secretary of State's office must supply the rest. The county should be responsible for all expenses incurred by the Secretary of State's office in this situation.

Recommendations

3. The State of California should conduct a needs assessment to understand where to prioritize security training.
4. The State of California should create a training curriculum individually tailored to the needs of each county election officer and key staff members to ensure they are operating at a high security standard.
 - Ideally, this curriculum should be informed by the needs assessment the Commission recommended above.
5. The State of California should create a comprehensive election worker training program to ensure its election workforce meets election security best practices. Concurrently, the state should create incentives for Californians to become election workers despite the increased requirements. These include but are not limited to:
 - Using its resources to train election workers on topics not specific to any county, leaving only county-specific training for the counties. Hands-on training with the equipment voters will use should be mandatory for all election workers.
 - Supplementing counties' base pay with bonuses for people who train to be election workers in historically difficult-to-fill locations.
 - Working with high schools and post-secondary institutions to create applied election administration courses so students could receive course credit for training as an election worker. They should still receive their stipends so that students from all economic backgrounds can afford to participate.
 - Allowing and encouraging the state workforce to commit to becoming election workers with enhanced training requirements without having to use their annual leave or vacation time.

6. The Secretary of State's office should provide well-trained staff to any voting jurisdiction that is unable to supply enough trained election workers to run an accessible election that meets best practices for security. The jurisdiction should compensate the Secretary of State for the workers' pay, including overtime and travel expenses if they need to use this option outside of a Governor-declared state of emergency.

Compliance Audits

Even with the best training and the latest equipment, human beings will make mistakes. California's Election Code outlines security procedures, but the state lacks any system to ensure compliance. Many witnesses recommended that the state institute a compliance audit to provide an additional layer of security.

The core feature of evidence-based elections is a voter-verified paper trail, which in California is a ballot. A compliance audit is the process of assessing the paper trail's trustworthiness from the moment that ballot is created to when it is properly destroyed after the election.³² Additionally, election officials must show that every validly cast vote was cast exactly once and their records are complete and intact from election to audit.³³

The Commission asked Dr. Stark what a compliance audit should look like. His high-level sketch is included in his [written testimony to the Commission](#), but in short, the following factors must be included in the audit in order for it to be effective:

- **Ballot Accounting.** Do the numbers add up? For example, if a polling place issued 200 ballots of a given kind, were they all fed through the optical scanner?
- **Eligibility.** Were all of the eligible ballots and no others included in the final count? What about the provisional ballots?

- **Physical Chain of Custody.** Are the custody logs detailing the minutia of interactions with voting equipment and ballots complete? Do, say, cross references between an action recorded in the log and video surveillance show that record was accurate?
- **Due Diligence.** What do the voting machine event logs show? How were complaints by voters addressed? What problems did poll workers report and how did election officers respond?

Many election officers already perform many of the components that would be included in a compliance audit as part of their regular canvass procedures. Witnesses recommended the state create a high standard, formalize the auditing process, require standardized reporting, and require the auditing to be conducted in a publicly verifiable manner. Multiple witnesses pointed out that few places have robust compliance audits; California could set the gold standard for others to follow.

The Secretary of State administers an election observation program that sends trained staff into the field to monitor and inspect in-person voting location operations. These officials report any problems they discover, and investigate reports made by voters and others outside of the Secretary of State's office. With necessary funding from the Legislature, the Secretary of State should expand this program by randomly auditing additional voting jurisdictions during and after the election and during the off-season to make sure that ballots and voting equipment are properly secured. These audits should be approached in the spirit of cooperation and a shared understanding that all parties involved are trying to ensure a secure, accessible election. The audit's action items should not just detail steps the county will take to better secure elections, but also how the Secretary of State's office will support them. The Secretary of State should regularly report the results of county and state audits to the Legislature.

Finally, the Secretary of State should work with the Administration and Legislature to create a series of actions that will be implemented should a compliance audit indicate that election process may have been compromised.

As with risk-limiting audits, enhanced training requirements and compliance audits will be mandates that must be funded by the state. Though the Commission typically does not make recommendations that would enact new state mandates, ensuring the integrity of the democratic process in California for generations to come is worthwhile stewardship of taxpayer dollars.

Recommendations

7. Led by the Secretary of State, the State of California should delineate standards and create the framework for mandatory compliance audits.

- The state should aim to set the gold standard for compliance audits.
- As part of this process, the Secretary of State should work with the Administration and Legislature to codify next steps if the audit uncovers serious errors.
- Compliance audits must be publicly verifiable.
- Audit results should be available in writing, shared with the Secretary of State's office, and be easily accessible to the public.

8. The Secretary of State should expand its election observation program by randomly auditing additional voting jurisdictions during, after, and between elections to ensure they are following laws and regulations. These audits should be conducted in the spirit of collaboration and if errors are uncovered, the Secretary of State should commit to working with the jurisdiction on improving its compliance with security measures. The Secretary of State should regularly report its findings and next steps to the Legislature. The Legislature should provide sufficient funding to support these activities.

■ Appendix A: Public Hearing Witnesses

The lists below reflect the titles and positions of witnesses at the time of the hearings.

Public Hearing on Voting Equipment Security

July 26, 2018

Sacramento, California

Kenneth Bennett, Program Manager, Voting Solutions for All People (VSAP), Los Angeles County Registrar-Recorder/County Clerk

Kammi Foote, Clerk-Recorder, County of Inyo

Susan Lapsley, Deputy Secretary of State, HAVA Director and Counsel, California Secretary of State

Noel Runyan, Owner, Personal Data Systems

E. John Sebes, Chief Technology Officer, Open Source Election Technology (OSET) Institute

Pamela Smith, Senior Advisor, Verified Voting

Philip Stark, Associate Dean, Mathematical and Physical Sciences and Professor, Department of Statistics, University of California, Berkeley

■ Notes

1. Lewis Griswold. December 3, 2020. "How California reached historic voter turnout despite pandemic, distrust." *CalMatters*. <https://calmatters.org/politics/votebeat/2020/11/california-historic-voter-turnout-despite-pandemic-distrust/>. Accessed March 11, 2021.
2. California Secretary of State. "Historical Voter Registration and Participation in Statewide General Elections 1910-2020." <https://www.sos.ca.gov/elections/statistics>. Accessed March 11, 2021.
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5. E. John Sebes, Chief Technology Officer, Open Source Election Technology (OSET) Institute. July 26, 2018. Sacramento, California. Testimony to the Commission.
6. U.S. Election Assistance Commission. "HAVA Funds: State Chart View." <https://www.eac.gov/payments-and-grants/hava-funds-state-chart-view/>. Accessed June 15, 2018. Also, SB 840. Mitchell. Budget Act of 2018-19. http://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180SB840.
7. Kim Zetter. March 14, 2019. "DARPA Is Building a \$10 Million, Open Source, Secure Voting System." *Motherboard: Tech by Vice*. https://www.vice.com/en_us/article/yw84q7/darpa-is-building-a-dollar10-million-open-source-secure-voting-system. Accessed August 28, 2020.
8. Matt Bishop, Professor, Computer Science, University of California, Davis. April 26, 2018. Phone call with Commission staff.
9. The system in question was an electronic voting system, which is not a best practice in election infrastructure security.
10. Kim Zetter. March 12, 2019. "Researchers Find Critical Backdoor in Swiss Online Voting System." *Motherboard: Tech by Vice*. https://www.vice.com/en_us/article/zmak3/researchers-find-critical-backdoor-in-swiss-online-voting-system. Accessed August 28, 2020.
11. E. John Sebes, Chief Technology Officer, Open Source Election Technology (OSET) Institute. July 26, 2018. Sacramento, California. Testimony to the Commission. Also, Philip Stark, Associate Dean, Mathematical and Physical Sciences and Professor, Department of Statistics, University of California, Berkeley. July 2, 2018. Sacramento, California. Testimony to the Commission.
12. Kammi Foote, Clerk-Recorder, County of Inyo. July 26, 2018. Sacramento, CA. Testimony to the Commission.
13. California Department of Technology. May 2018. Technology Letter 18-02. <https://codecagov-playbook.readthedocs.io/en/latest/policy/>. Accessed August 28, 2020.
14. Joseph Lorenzo Hall. February 11, 2009. "Improving the Security, Transparency and Efficiency of California's 1% Manual Tally Procedures." USENIX/ACCURATE Electronic Voting Technology Workshop 2009. https://www.usenix.org/legacy/event/evt08/tech/full_papers/hall/hall_html/. Accessed September 14, 2018.
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 17. Philip Stark, Associate Dean, Mathematical and Physical Sciences and Professor, Department of Statistics, University of California, Berkeley. July 2, 2018. Written testimony to the Commission. <https://lhc.ca.gov/sites/lhc.ca.gov/files/Reports/247/WrittenTestimony/StarkJuly2018.pdf>. Page 3.
 18. Philip Stark, Associate Dean, Mathematical and Physical Sciences and Professor, Department of Statistics, University of California, Berkeley. July 2, 2018. Written testimony to the Commission. <https://lhc.ca.gov/sites/lhc.ca.gov/files/Reports/247/WrittenTestimony/StarkJuly2018.pdf>. Page 3.
 19. Dwight Shellman, County Support Manager, Elections Division, Colorado Department of State. June 15, 2015. “Risk-Limiting Audits in Colorado.” Presentation to the National Conference of State Legislatures conference: The Future of Elections. http://www.ncsl.org/Portals/1/Documents/Elections/RLA_20170615.pdf. Accessed September 19, 2018.
 20. Mark Lindeman and Philip B. Stark. 2012. “A Gentle Introduction to Risk-Limiting Audits.” IEEE Security and Privacy, Special Issue on Electronic Voting. <https://www.stat.berkeley.edu/~stark/Preprints/gentle12.pdf>. Accessed September 19, 2018.
 21. Mark Lindeman and Philip B. Stark. 2012. “A Gentle Introduction to Risk-Limiting Audits.” IEEE Security and Privacy, Special Issue on Electronic Voting. <https://www.stat.berkeley.edu/~stark/Preprints/gentle12.pdf>. Accessed September 19, 2018.
 22. AB 2125 (Quirk, 2018). Chapter 913, Statutes of 2018.
 23. AB 2400 (Quirk, 2020). Chapter 33, Statutes of 2020.
 24. California Secretary of State. March 1, 2011. “AB 2023 (Saldaña), Chapter 122, Statutes of 2010 Post-Election Risk-Limiting Audit Pilot Program March 1, 2012, Report to the Legislature.” <https://admin.cdn.sos.ca.gov/reports/2012/post-election-audit-report-20120301.pdf>. Accessed August 18, 2020.
 25. Kenneth Bennett, Program Manager, Voting Solutions for All People (VSAP), Los Angeles County Registrar-Recorder/County Clerk. July 26, 2018. Written testimony to the Commission.
 26. Kammi Foote, Clerk-Recorder & Registrar of Voters, County of Inyo. April 20, 2018. “Report on the Inyo County Risk Limiting Audit Pilot.” Can be viewed as an attachment to Ms. Foote’s testimony at lhc.ca.gov.
 27. Philip Stark, Associate Dean, Mathematical and Physical Sciences and Professor, Department of Statistics, University of California, Berkeley. July 26, 2018. Sacramento, CA. Testimony to the Commission.
 28. Matt Bishop, Professor, Computer Science, University of California, Davis. April 26, 2018. Phone call with Commission staff.

29. Kammi Foote, Clerk-Recorder, County of Inyo. July 26, 2018. Written testimony to the Commission.
30. David Dill, Emeritus Professor, Stanford University and Founder, Verified Voting. April 12, 2018. Phone call with Commission staff.
31. Matt Vasilogambros. October 22, 2018. "Few People Want to be Poll Workers, and That's a Problem." Stateline. <https://www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2018/10/22/few-people-want-to-be-poll-workers-and-thats-a-problem>. Accessed September 4, 2020.
32. Philip Stark, Associate Dean, Mathematical and Physical Sciences and Professor, Department of Statistics, University of California, Berkeley. July 26, 2018. Written testimony to the Commission. Also, California Elections Code. Division 17. Chapter 4. Sections 17301 and 17302.
33. Philip Stark, Associate Dean, Mathematical and Physical Sciences and Professor, Department of Statistics, University of California, Berkeley. July 26, 2018. Written testimony to the Commission.

■ Little Hoover Commission Members

CHAIRMAN PEDRO NAVA | Santa Barbara

Appointed to the Commission by Speaker of the Assembly John Pérez in April 2013 and reappointed by Speaker of the Assembly Anthony Rendon in 2017. Government relations advisor. Former State Assemblymember from 2004 to 2010, civil litigator, deputy district attorney and member of the state Coastal Commission. Elected chair of the Commission in March 2014.

VICE CHAIRMAN SEAN VARNER | Riverside

Appointed to the Commission by Governor Edmund G. Brown Jr. in April 2016 and reappointed in January 2018. Managing partner at Varner & Brandt LLP where he practices as a transactional attorney focusing on mergers and acquisitions, finance, real estate, and general counsel work. Elected vice chair of the Commission in March 2017.

DION ARONER | Berkeley

Appointed to the Commission by the Senate Rules Committee in April 2019. Partner for Aroner, Jewel, and Ellis. Former State Assemblymember from 1996 to 2002, chief of staff for Assemblymember Tom Bates, social worker for Alameda County, and the first female president of Service Employees International Union 535.

DAVID BEIER | San Francisco

Appointed to the Commission by Governor Edmund G. Brown Jr. in June 2014 and reappointed in January 2018. Managing director of Bay City Capital. Former senior officer of Genentech and Amgen, and counsel to the U.S. House of Representatives Committee on the Judiciary.

CYNTHIA BUIZA | Los Angeles

Appointed to the Commission by Speaker of the Assembly Anthony Rendon in October 2018. Executive director of the California Immigrant Policy Center. Former policy director for the American Civil Liberties Union, San Diego, and policy and advocacy director at the Coalition for Humane Immigrant Rights of Los Angeles.

BILL EMMERSON | Redlands

Appointed to the Commission by Governor Edmund G. Brown Jr. in December 2018. Former senior vice president of state relations and advocacy at the California Hospital Association, State Senator from 2010 to 2013, State Assemblymember from 2004 to 2010, and orthodontist.

ASM. CHAD MAYES | Yucca Valley

Appointed to the Commission by Speaker of the Assembly Toni Atkins in September 2015. Elected in November 2014 to represent the 42nd Assembly District. Represents Beaumont, Hemet, La Quinta, Palm Desert, Palm Springs, San Jacinto, Twentynine Palms, Yucaipa, Yucca Valley, and surrounding areas.

SEN. JIM NIELSEN | Gerber

Appointed to the Commission by the Senate Rules Committee in March 2019. Elected in January 2013 to represent the 4th Senate District. Represents Chico, Oroville, Paradise, Red Bluff, Yuba City, and surrounding areas.

ASM. BILL QUIRK | Hayward

Appointed to the Commission by Speaker of the Assembly Anthony Rendon in 2017. Elected in November 2012 to represent the 20th Assembly District. Represents Hayward, Union City, Castro Valley, San Lorenzo, Ashland, Cherryland, Fairview, Sunol, and North Fremont.

SEN. RICHARD ROTH | Riverside

Appointed to the Commission by the Senate Rules Committee in February 2013. Elected in November 2012 to represent the 31st Senate District. Represents Corona, Coronita, Eastvale, El Cerrito, Highgrove, Home Gardens, Jurupa Valley, March Air Reserve Base, Mead Valley, Moreno Valley, Norco, Perris, and Riverside.

CATHY SCHWAMBERGER | Calistoga

Appointed to the Commission by the Senate Rules Committee in April 2018 and reappointed in January 2019. Associate general counsel for State Farm Mutual Automobile Insurance Company. Former board member of the Civil Justice Association of California and the Capital Political Action Committee.

JANNA SIDLEY | Los Angeles

Appointed to the Commission by Governor Edmund G. Brown Jr. in April 2016 and reappointed in February 2020. General counsel at the Port of Los Angeles since 2013. Former deputy city attorney at the Los Angeles City Attorney's Office from 2003 to 2013.

Full biographies are available on the Commission's website at www.lhc.ca.gov.

“DEMOCRACY ITSELF IS A PROCESS OF CHANGE, AND SATISFACTION AND COMPLACENCY ARE ENEMIES OF GOOD GOVERNMENT.”

By Governor Edmund G. “Pat” Brown,
addressing the inaugural meeting of the Little Hoover Commission,
April 24, 1962, Sacramento, California



Milton Marks Commission on California State
Government Organization and Economy

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