Signature Verification and Mail Ballots: Guaranteeing Access While Preserving Integrity

A Case Study of California's Every Vote Counts Act

Stanford Law School
Law and Policy Lab

Policy Practicum: Every Vote Counts (Law 806Z)
Spring 2019-20

May 15, 2020

Signature Verification and Mail Ballots: Guaranteeing Access While Preserving Integrity

A Case Study of California's Every Vote Counts Act

RESEARCH TEAM
Roxana Arjon (BA Public Policy '22)
Ali Haley Phillips Bloomgarden (MA Education Policy '20)
Benjamin C Hattem (JD '20)
Garrett Jensen (MPP/MA Education '20)
Zahavah Levine (Distinguished Career Institute Fellow 2019-20)
Mike Norton, Ph.D. (JD '21)
Megha Nanaki Parwani (BA Philosophy/Political Science '21)
Emily Postman (JD '21)
Ashwin Ramaswami (BS Computer Science '21)
Grace Rybak (JD '21)
Emily Wilson (BA History '20)

Policy Practicum: Every Vote Counts (Law 806Z)
2019-20

Client: Stanford Law Election Law Project

TEACHING TEAM / PROJECT LEADS
Will Janover (JD '21)
Tom Westphal (JD/MIP '21)

PROJECT ADVISORS
Nate Persily
James B. McClatchy Professor of Law
Stanford Law School

Luciana Herman
Lecturer & Policy Lab Program Director
Stanford Law School

Acknowledgments

The idea for this study, the product of a six-month review of county practices of the implementation of California Senate Bill 759, first emerged in a meeting of the Stanford Election Law Project (ELP). ELP is a student interest group that discusses current issues in election law with attention to understudied issues with significant policy implications. At that meeting, the group recognized the importance of vote-by-mail nationally and the potential of the Every Vote Counts Act (EVCA, SB 759) to serve as a model for other states. ELP student leaders discussed the issue with Professor Nate Persily, who specializes in the law of democracy, and soon realized the extensive research needed to understand the impact of SB 759 on the operations of county registrars. Under Professor Persily's guidance, a research project emerged in the form of a Stanford Law and Policy Lab practicum, "Every Vote Counts" (Law 806Z), staffed by an interdisciplinary team of 10 students. Professor Persily counseled on the research design and established connections for the team with many leading election officials. Will Janover and Tom Westphal assumed the roles of project leads and teaching team and, together with Policy Lab Program Director Luciana Herman, established the foundation for a qualitative study of California county practices implementing the signature verification and notice and remedy features of the EVCA. As the policy client for the project, the Election Law Project enabled the research team to have full independence in examining the issues.

The student teams interviewed county election officials from 33 of 58 California counties. Most interviews were conducted remotely by videoconference or by phone with follow-up questions via email. Respondent registrars were gracious and generous with their time, and a special note of appreciation goes to these registrars and their staff for candidly sharing their experiences and helping us to surface lessons and practices that may benefit other registrars in California and other states. Without these registrars' generous contribution of information and ideas, this project would not have been possible.

To augment findings from interviews with county registrars, the research team also met with elections experts and legal authorities. Massachusetts Institute of Technology Professor of Political Science Charles Stewart and Judd Choate (Director, Division of Elections, Colorado Department of State) introduced the teams to some significant challenges facing county offices handling high volumes of vote-by-mail ballots. Professor Stewart is the Co-Director for the Caltech/MIT Voting Technology Project, which analyzes election technology, election administration, and election reform. Professor Stewart's guidance helped the team scope registrar operations, including issues pertaining to technology used to verify signatures. Director Choate described the important administrative roles registrars in his state face in managing high numbers of vote-by-mail (VBM) ballots, and he introduced teams to methods used to analyze signatures. Independent attorney Michael Risher shared his experiences litigating *LaFollette v. Padilla* (2018), the legal case that spurred the California legislature to pass SB 759. Loyola Law School Professor and Associate Dean for Research Justin Levitt provided invaluable feedback on draft versions of this report. Christina Fletes and Raul Macias, both with the ACLU of Northern California, also helped the research team anticipate key issues related to implementation of the law.

Foreword

When our team of Stanford University students began researching California's vote-by-mail (VBM) system in fall 2019, we never could have anticipated the implications of this work for a global health crisis. As we spoke with 33 California county elections leaders and their teams, we heard some repeated concerns. Many county officials emphasized the need to defend against cyber-attacks on election infrastructures; others emphasized the need for retaining local control over election processes. The effects of a pandemic on democratic participation were not on anyone's mind.

The novel coronavirus (COVID-19) has profoundly disrupted our lives. But even as much in our world can be delayed, shut down, or canceled, elections must go on. In an executive order responding to the crisis, California Governor Gavin Newsom has mandated that all California counties send ballots by mail to all California voters who wish to protect their health by voting from home in the November general election. California's practices may offer lessons for other state governments and their local election administrators who share the imperative to take action to ensure that elections safely proceed.

With in-person voting posing public health and safety risks, states must expand access to registration and voting at home by mail. Yet, with only six months left until Election Day, it will not be easy for election administrators to implement necessary VBM processes in time. The complexities and nuances of VBM signature verification, detailed in this report, should prove helpful in allowing states to more confidently confirm the identities of voters and communicate when mistakes arise (most often in missing or mismatched signatures). Now is the time to borrow good practices from states like California, Colorado, Oregon, Utah, and Washington, where there are decades long histories in providing honest and expedient VBM elections.

And while expanded VBM is necessary, it is not a silver bullet: states must provide at least some safe in-person polling and drop-off options so that citizens and poll workers do not have to choose between expressing the right to vote and compromising their health. Tradeoffs exist. Campaign officials and the public alike, for example, lament the need for extended vote-counting periods that are a necessary consequence of voting by mail. Yet this verification period is a tradeoff we must be willing to accept if we are to honor voters' voices even as we guard against the global threat of coronavirus contagion.

In California, we hope this report helps refine lessons across counties. Outside California, state and local election officials can glean methods and effective practices to improve their own systems of signature verification. We further hope that California's Every Vote Counts Act (EVCA) can serve as inspiration for states to move towards more vigorous forms of notifying and giving voters a chance to fix insufficient signatures. Our recommendations are meant to act as a guide for all stakeholders: county election offices, secretaries of state, state legislatures, and most importantly, the voters.

The Every Vote Counts Law and Policy Lab Research Team

Stanford Law School

https://law.stanford.edu/education/only-at-sls/law-policy-lab/practicums-2019-2020/every-vote-counts-voter-verification-project-806z

Table of Contents

EXECUTIVE SUMMARY....1
Key Findings....2
INTRODUCTION....9
A History of Voting by Mail....9
A. Evolution of Vote-By-Mail in U.S. Elections....9
B. The Rise of Vote-By-Mail in California....11
C. Considerations Regarding Increased Use of Vote-by-Mail in California....12
D. Signature Verification and the EVCA....13
About This Study....15
Methodology....17
A. Project History....17
B. Interviews with County Registrars of Voters....17
C. EAVS Survey Results....19
AGGREGATED FINDINGS....21
Introduction....21
Signature Verification....22
A. Ballot Return ID Envelope Design....22
B. Typical County Signature Review Processes....23
C. Verification Criteria and Standards....25
D. Automated Processes....28
E. Training and Staffing....31
F. Election Observers....33
G. Impact of Specific Processes and Practices on Rejection Rates....34
Notice and Remedy....41
A. The Impact of the Every Vote Counts Act on County Practices....42
B. Notice....43
C. Remedy....45
D. Measuring the Effect of the EVCA....46
Recommendations....49
A. Recommendations for California Voters....49
B. Recommendations for County Election Officials....50
C. Recommendations for the California Secretary of State....52
D. Recommendations for the California Secretary of State, in partnership with the Department of Motor Vehicles....53
E. Recommendations for the California State Legislature....53
APPENDICES....57
Appendix I – Counties by Population Size....57
Appendix II - County Fact Sheets and Vote-by-Mail Ballot ID Return Envelopes....59
Appendix III - Automated Processes Vendors List....111
Appendix IV - Regression Results....112

List of Graphs, Charts, and Illustrations

Figure 1: Historic VBM Use in California Elections. 12

Figure 2: Map of California with Counties Surveyed and Categorized by Size 16

Figure 3....21

Figure 4: Photo of Signature Verification Screen 25

Figure 5: Images of Signatures from Colorado Secretary of State Signature Training Guide....27

Table 1: VBM Rejection Rates and Share of Rejections For Signature Mismatch 35

Figures 6 and 7: 36

Figure 6: Effect of Different Reforms on VBM Rejection Rate 36

Figure 7: Effect of Different Reforms on Mismatch Share....36

Figure 8: VBM Rejection Rate Before and After Adopting Matching Automation 38

Figure 9: VBM Mismatch Share Before and After Adopting Matching Automation....38

Figure 10: VBM Rejection Rate Before and After Adopting Entirely VBM Elections 39

Figure 11: Remedy Rate by Notification Form....40

Figure 12: Challenge Rate 41

Figure 13: Image of BallotTrax Portal for Santa Clara County 44

Table 2: VBM Rejection Rates and Share of Rejections For Signature Mismatch 47

Figure 14: Year Trends and the Returned VBM Rejection Rate 47

Figure 15: Year Trends and the Rejected VBM Mismatch Share 48

EXECUTIVE SUMMARY

When voters cast ballots by mail, election officials need a method to verify their identity to ensure the integrity of the election. In many states, including California, county officials use signature verification, a process by which election officials compare the signature on a vote-by-mail (VBM) ballot return ID envelope to the signatures in a voter's registration file. If the signatures are sufficiently similar, the ballot is accepted and counted—if not, it is set aside for election officials to review further and attempt to verify the voter's identity.

California has been a leader among states in expanding options and facilitating vote-by-mail. Prior to the COVID-19 pandemic, the California Secretary of State, under the Voter's Choice Act (SB 450), planned a staged rollout of voting by mail, with statewide adoption by 2024. In response to the pandemic, however, the California Governor signed an executive order mandating that all California voters be given the option to vote at home and send their ballot in by mail for the November general election (Executive Order N-64-20). Other states and counties are also adopting the practice of voting by mail to help keep their citizens healthy. This national shift now spotlights all aspects of the vote-by-mail process, with attention to signature verification. Small variations in these practices can decide close races.

The purpose of this study is to understand how California counties manage two related electoral processes: (1) verifying signatures on vote-by-mail ballot return ID envelopes and (2) notifying voters whose signatures were rejected and providing a process to allow voters to remedy this rejection. The latter process encompasses requirements mandated by recent California legislation entitled the Every Vote Counts Act (EVCA), SB 759.

We hope making this information accessible to election officials and the general public will raise awareness of how vote-by-mail ballots are processed in California. We also hope that, as a result, policymakers in California and elsewhere will gain a better understanding of how counties are performing these key electoral functions. Based on this study's findings, we provide a set of recommendations directed to county election officials, the California Secretary of State's Office, and to voters themselves to improve these processes and to ensure that, indeed, every vote is counted.

This report is the product of both quantitative analysis and qualitative interviews. To assess the effects of different signature verification processes on vote-by-mail rejection rates, we gathered and analyzed historical voting data for all California counties from 2004 through 2018 from the Election Administration and Voter Survey (EAVS). The bulk of our study, however, grows out of interviews with several national election administration experts and with election officials from thirty-three of California's fifty-eight counties. While county procedures are identified, quotes are not attributed to individual county officials to preserve confidentiality. Together, the 33 California counties we surveyed represent over 32 million people—more than 80% of the state's population.

Key Findings

This study focuses on (1) vote-by-mail signature verification processes and (2) notice and remedy procedures for unverified signatures. We examined the design of ballot return ID envelopes, the use of automated processes, methods of staff training, techniques used to match signatures, and policies concerning outside observers. We also detailed the different methods used to notify voters of an unmatched signature to let them remedy the mismatch and ensure that the ballot is counted, as well as the methods counties use to validate the remedied signatures. We found that California counties employ a wide variety of approaches to signature verification, notice, and signature remedy.

Staff Hiring and Training

- There are general differences in how smaller and larger population counties hire and train staff reflect both county-level needs and limited resources.
    - Larger counties tend to hire temporary staff to complement their already sizable permanent staff, formally training the entire group.
    - Smaller counties tend to retain consistent, permanent staff and engage in informal training and mentoring.
- Some counties have partnerships with law enforcement forensic experts to train staff in basic graphology (handwriting identification) techniques.
- The California Association of Clerks and Elections Officials (CACEO) plays an important role in coordinating training opportunities through workshops and conferences.

Automated Systems

- While most counties we surveyed use automatic signature scanners and mail sorters, only nine counties use automated systems for signature matching purposes—though a few more are considering moving to automation for the 2020 general election.
- As counties adopt the Voter's Choice Act, they tend to shift toward greater automation.
- Despite the efficiency gains that automated systems provide, some counties have been hesitant to adopt them due to concerns over accuracy and reliability.

Criteria and Standards to Verify Signatures

- There are limited statewide uniform criteria or standards for signature verification, and what 'counts' as a matching signature varies enormously from county to county.
- More populous counties tend to develop and codify specific signature verification standards for internal use.
- Less populous counties tend to rely on institutional memory, based on practices developed over time by small teams of permanent staff.
- Many county registrars expressed concern about the challenges posed by low-resolution (and at times illegible) digital signatures collected by the DMV, and by printed names that some voters write in lieu of signatures on ballot return envelopes.
- Less populous counties tend to offer individualized attention to signatures, including consideration of why a voter's signature might change over time or look different from a past election.

Election Observers

- Counties vary in the access they give to observers, with some allowing observers to view signatures as the envelopes are reviewed and others requiring observation behind stanchions or a glass window.
- Close elections tend to attract party representatives to observe the signature matching process.
- Some county registrars described the need to balance observers' right to access with reviewers' need to perform their work and concerns over voter privacy.
- Challenged signatures often escalate to higher levels of review—sometimes directly to the County Registrar.

Notifying a Voter of a Mismatched Signature

- All counties surveyed comply with baseline requirements of the EVCA to notify voters by mail through the United States Postal Service (USPS).
- Many counties supplement the EVCA's USPS mail notification requirement by also attempting to contact voters via email and phone. Others use Facebook messaging and/or SMS text messaging to notify voters a second time of a mismatched signature. Some counties follow up with a second notice letter or message when voters do not respond promptly to the first letter.
- Several counties provide online portals where voters can access information about the status of their ballots.
- However, a few counties have reduced their notification measures after the passage of the EVCA. Interpreting the EVCA as prescribing USPS mail as the only method of notifying voters, these counties have stopped their previous practices of notifying voters in person and/or by phone.

Remedy Methods

- All counties allow voters to remedy a mismatched signature by mail, but several do not allow voters to remedy a mismatched signature by email and/or fax. The EVCA requires counties to use all three remedy methods.
- Nearly all counties surveyed recognize the possibility of signature variation and have policies in place that allow staff to match a cured signature from a collection of voter signatures on file from previous elections.
- Counties facilitate remedy for mismatched signatures through a variety of disparate practices, such as:
    - Including a return envelope, in some cases with pre-paid postage.
    - Requesting voters to return multiple versions of their signature to keep on file.
    - In-person visits by county staff to help voters with limited mobility.

Highlights from Election Administration and Voter Survey Data (EAVS, 2004-2018)

- In general, the use of automated algorithmic matching technology, entirely VBM elections, and levels of review had no statistically significant effect on the percentage of votes rejected for signature mismatch.
- However, evidence from the 2018 elections suggests that the ECVA's formal notification requirements may be effective in facilitating more cures.

- Use of entirely VBM elections actually decreased the overall rejection rate, a 52% reduction for the average county, while using automated technology without human review increased the rejection rate by 74% for the average county.
- Follow-up remedy notification letters are highly effective—the two counties using them had remedy rates 26 points higher than the average of all other counties.
- Counties show marked inconsistencies, particularly in 2018, in reporting EAVS data to the Election Assistance Commission—specifically the reason for a ballot rejection and what constitutes a rejection (e.g., including categorizing undeliverable ballots as "rejected")—which complicates deciphering lessons and good practices.

Recommendations

The recommendations here are grounded in research findings and organized according to the needs of voters, county registrars, and the California Secretary of State. The recommendations conclude with suggestions for legislation and appropriations.

Voters should:

- Ensure that their registration information is current.
- Provide their county election office with their contact information, including cell phone number and email address, as it changes.
- Understand that they should use the signature on file with the county and update their signature if it has changed since they registered.
- Know to *sign*, not *print*, their name on the ballot return ID envelope.
- Be sure to sign *their own* ballot return ID envelope.

County Registrars should:

- Provide remedy letters to voters in their preferred language.
- Include postage-paid return envelopes with signature mismatch notification letters and verification forms.
- Publish written policies describing the signature verification criteria and verification processes that county election officials use.
- Develop a simple, streamlined way for voters to verify which of their signatures is on file and to view it.
- Ask voters to provide multiple samples of their signature during both the registration and remedy processes.
- Adjust county processes to develop "lifetime" databases of voter signatures, allowing election workers to see how voters' signatures change over time.
- Follow up a second time with voters who fail to respond to the first mailed letter notifying them of a signature mismatch.

- Ensure that public observers have sufficient access to the signature verification process.
- Explore e-notification technologies (e.g., email and SMS) to facilitate prompt voter notification. This requires counties to have a voter's phone or email contact information. County officials are conscious of the tension between their ability to collect this information and voters' concerns with privacy.
- Maintain data that tracks costs and remedy rates associated with different practices and technologies to help surface those that are most cost-effective.
- Ensure that ballot return ID envelopes explicitly state that a voter's signature will be compared to the signature/s in their registration file.

The California Secretary of State should:

- Develop and publish a set of signature verification guidelines for use by county officials, including verification criteria and best practices for notice and remedy, while making sure they are flexible enough to avoid challenging plainly valid signatures.
- Work with county election officials and registration volunteers to ensure that voters are educated on the importance of their signature and generally aware of the existence of notification procedures in the event of a mismatch on their ballot.
- Communicate with California high school civics educators to encourage them to explain to students the important role of the signature in voting.
- Create a repository of remedy letters in all federal- and state-mandated languages for use by county officials.
- Standardize coding for signature rejection data, and require counties to report the information accurately to EAVS.
- Develop simple language to enhance the statement on the ballot return ID envelope to explain how voter signatures are used.

The California Secretary of State, in partnership with the Department of Motor Vehicles, should:

- Introduce signage at the DMV office to raise voters' awareness of the importance of their signature in voting.
- Add a prompt at the time of signing the electronic pad explaining how their signature may be used when voting by mail and asking voters to acknowledge their understanding of such use.
- Train DMV personnel to advise voters briefly on the importance of the signature.
- Work with county election officials to assess their needs for higher resolution signatures. Then, as needed, procure higher resolution signature pads that produce signature images more similar to signatures signed in pen on a ballot return ID envelope.

The California State Legislature should:

- **Pass legislation implementing the following requirements for county election agencies:**
  - **Require county election agencies to send voters with mismatched signatures a second follow-up remedy letter if the first letter is not returned within a week of mailing.** Sending multiple remedy letters leads to higher return rates than outreach via multiple forms of communication. Remedy rates for the counties with follow-up letters were nearly double those for other counties. Voters are far more likely to remedy after receipt of a second letter, and more likely to respond to more official-seeming forms such as mail than one-off email or phone calls.
  - **Require county election agencies to develop and publish written policies describing the signature verification criteria and verification processes used in vote-by-mail processing.** Our findings show that these criteria and processes are not standardized and vary significantly across counties. Many county officials we interviewed also indicated that voters lack basic information regarding the importance of their signatures to the voting process. Despite this, most counties do not have a publicly available, written explanation of the signature verification criteria and processes they use. Requiring the posting of a written explanation of this procedure on each county's website is a helpful, low-cost first step in educating voters on this issue. In the alternative, uniform state guidelines for signature verification criteria could be mandated for all counties to follow.
  - **Require county election agencies to provide remedy letters to voters in their preferred language.** Federal legislation and California law require counties to provide specified electoral materials in languages other than English (See 52 U.S.C. § 10503 (Voting Rights Act Section 203); 28 C.F.R. § 55; California Elections Code §§ 12303, 14201.) This is supposed to cover documents related to all stages of the electoral process, from voter registration through activities related to conducting elections (28 C.F.R. § 55.15). We propose the legislature make clear that they have interpreted their obligations under Section 203 to require them to provide remedy letters in all relevant languages. Given the small number of remedy letters dispatched in each election, we do not foresee this requirement to be prohibitively expensive. This low-cost action can help improve the remedy rate of signature verification challenges for non-English-preferring voters. The Secretary of State should also develop a repository, for use by county registrars, with template letters in the languages required by Federal and California law.
  - **Allow voters to 'opt out' of including their email and phone number as publicly available information in their voter registration file.** Voters are not required to provide email or phone number contact information when they register, and many voters choose not to. Many county election officials we interviewed indicated that this was because voters did not want this information made available to political campaigns. However, this limits the methods county officials can use to inform voters when there is an issue with their signature. We recognize that political campaigns and interest groups often rely on voter registration information to mobilize voters, and play a key role in voter turnout. However, restricting the 'opt-out' function to voters' email and phone number—which are already optional—should limit the impact on voter mobilization efforts. Providing an 'opt-out' option for voters for these specific types of contact information could increase voters' willingness to share such information with county election officials.

- **Require counties to explain on the ballot return ID envelope how voter signatures are used.** Current California law specifies several requirements for what information must be provided on the envelope voters use to return vote-by-mail ballots (See Cal. Elec. Code Sec. 3011(a)), but there is no requirement to explain how voter signatures will be verified. The ballot return ID envelope template developed by the California Secretary of State and the Center for Civic Design does include such a statement, which informs the voter that "Your signature must match the signature on your voter registration card." But not all counties use this template, and this suggestion should be codified into law to ensure all voters are informed of signature verification requirements.
- **Require counties to include a postage-paid, return envelope with remedy letters.** While we understand this imposes an additional expense on already-stretched county budgets, the number of remedy letters is relatively small, and only those voters that elect to use the postage-paid envelope to remedy will result in an actual USPS expense.

• **Pass legislation requiring the California Secretary of State to do the following:**

- **Develop and publish more specific signature verification guidelines for use by county officials.** Federal legislation requires each state to adopt "uniform and nondiscriminatory standards that define what constitutes a vote and what will be counted as a vote for each category of voting systems used in the State" (See 52 U.S.C. § 21081(a)(6) (Help America Vote Act of 2002)). The California Secretary of State's office has developed and published standards. However, these standards include minimal information related to signature verification. More specific guidance on signature verification criteria, standards and processes could help reduce the wide degree of variability seen at the county level. As a starting point, we recommend looking at the format of the Colorado Secretary of State's signature verification guide, which includes specific criteria and a recommended training program for election officials working in the area. If this recommendation is not adopted or the Secretary of State elects to distribute nonbinding guidelines, counties should be required to publish a description of their signature verification processes and standards.

• **Appropriate money for the following purposes:**

- **Defray costs associated with the above recommendations.** Making additional funds available to counties can help cover the (minimal) costs associated with implementing the above recommendations.
- **Assist the DMV and other state agencies involved in voter registration in procuring high resolution digital signature capture pads.** Many county officials we interviewed commented that low-quality signatures initially gathered by the DMV from voters during voter registration pose substantial challenges during the signature verification process. They largely blamed the DMV's signature pad technology, which did not capture voters' signatures in sufficient detail (due to the quality of the screen captures) to allow county officials to verify them later.

Conclusion

The professionalism of California county election officials helps to ensure the integrity of our elections. County election officials across California are making good faith efforts to comply with EVCA. Counties may interpret EVCA differently, but they tend to interpret the law in terms of its spirit in favor of the voter. In providing transparency about how counties comply with EVCA, this report helps to surface lessons and practices that may improve outcomes in the spirit of the law where "every vote counts." These findings may help educate voters on the importance of their signatures and the processes used to count their votes. The lessons benefit county election agencies through better understanding of each other's practices and may encourage them to share information that improves outcomes. The results may further assist the California Secretary of State in developing guidelines that ensure consistency in the implementation of EVCA to guarantee the highest integrity of our elections.

In the face of the current pandemic, this report further guides other states seeking to implement or enhance their own vote-by-mail operations. Voting by mail has risen to prominence as a solution in the November general election to mitigating the threat of voters' exposure to COVID-19. By lengthening the voting cycle, voting by mail protects the health of voters and poll workers by eliminating reliance on crowded polling places. This report can help other states decide how they may implement the hard-won lessons of California as they prepare to administer elections in this unusual era of pandemic.

INTRODUCTION

Even before the COVID-19 epidemic forced jurisdictions throughout the United States to consider moving away from traditional in-person polling places, an increasing share of voters had cast their votes by mail in each recent election. As more and more Americans vote beyond the watchful eye of poll workers, however, new concerns about both election integrity and disfranchisement have arisen. The linchpin of voter identification in vote-by-mail regimes—signature verification—has become a critical stage in the process. Little is known, however, about how different states and localities operationalize this requirement.

This report seeks to fill that informational void, using California as a case study. Because of the state's recent legislation related to signature verification procedures for mail ballots,[1] it is an opportune time to take stock of the different signature verification regimes in California counties. Throughout the fall of 2019, students in a Stanford Law School Policy Practicum interviewed election officials throughout California and analyzed the data related to mail balloting. They collected information about the diverse array of procedures, personnel, and technologies counties use to verify signatures on ballots. They also analyzed the survey data related to these practices that counties provided to the Election Assistance Commission. The product of that investigation is presented here, followed by recommendations that flow from the best practices the students assessed from the comparative study of California counties.

A History of Voting by Mail

A. Evolution of Vote-By-Mail in U.S. Elections

In the late 19th century, when states first adopted the secret ballot (commonly known as the Australian ballot) voters did not have much choice in how and where to vote: they voted in person, at designated polling places, on Election Day.[2] Over time, however, driven by desires to accommodate a wider range of voters, reduce the burdens of voting, and reduce the costs of election administration,[3] Congress and state legislatures have provided voters with an ever-more flexible array of voting options. These

1 California Senate Bill No. 759 (amending Section 3019 of the California Elections Code) (filed Sept 17, 2018), and amended by California Senate Bill No. 523 (amending Sections 3019 and 2194 of the California Elections Code) (enrolled Sept 16, 2019).

2 MIT Election Lab, "Voting by Mail and Absentee Voting," https://electionlab.mit.edu/research/voting-mail-and-absentee-voting.

3 Charles Stewart III, "Losing Votes by Mail," *New York University Journal of Legislation and Public Policy* (2010), 13 (3): 573–574.

States first permitted voting outside of the polling place to accommodate soldiers away from home during the Civil War, and later during World War II…Today, all states offer some version of absentee voting (or vote-by-mail), but there is substantial variation across and within states.

vary significantly by state, but today, about a quarter of American voters[4] and 65% percent of California voters are voting by mail.[5]

States first permitted voting outside of the polling place to accommodate soldiers away from home during the Civil War, and later during World War II.[6] More recently, Congress expanded and modernized mail voting access to military personnel stationed abroad as well as American citizens living abroad in the 1986 Uniformed and Overseas Citizens Absentee Voting Act (UOCAVA) and the 2009 Military and Overseas Voter Empowerment (MOVE) Act.[7]

Absentee voting laws were first extended to non-military voters in the late 1800s.[8] The early state laws were generally limited to voters with qualified "excuses," such as being away from home or seriously ill on Election Day. The number of absentee ballots distributed in these circumstances was relatively small, even through most of the second half of the twentieth century.[9]

In the past forty years, however, absentee voting has expanded to include "no excuse" absentee voting, permanent absentee voting, and all-mail elections. Today, all states offer some version of absentee voting (or vote-by-mail), but there is substantial variation across and within states.[10] Following an initiative in 1998,[11] Oregon became the first state to implement all-mail balloting statewide. Today, Utah, Colorado, Hawaii, and Washington have also implemented that standard, with California now joining them (by the Governor's Executive Order) for the 2020 general election.[12] As a consequence of these expanded options for absentee voting and vote-by-mail, the percentage of the American electorate voting by mail has surged in the last few decades. In the 2016 presidential election, 24% of voters received and/or cast their ballot by mail.[13]

---

4 Andrew Menger and Robert M. Stein, "Choosing the Less Convenient Way to Vote: An Anomaly in Vote by Mail Elections," *Political Research Quarterly*, December 6, 2019, p. 106591291989000, doi.org/10.1177/1065912919890009 (citing Election Assistance Commission 2017).

5 California Secretary of State, "Historical Vote-By-Mail (Absentee) Ballot Use in California," sos.ca.gov/elections/historical-absentee/.

6 MIT Election Lab, "Voting by Mail and Absentee Voting," https://electionlab.mit.edu/research/voting-mail-and-absentee-voting.

7 Ibid. MOVE provides for the Federal Post Card Application that overseas voters can use to register to vote and request an absentee ballot simultaneously. The law also provides for the Federal Write-In Absentee Ballot, which allows overseas voters who have not received their regular ballot to vote a ballot for federal offices.

8 Ibid.

9 Ibid.

10 Wendy Underhill, Absentee and Early Voting (National Conference of State Legislators), ncsl.org/research/elections-and-campaigns/absentee-and-early-voting.aspx.

11 Oregon Ballot Measure 60, 1998.

12 Dari Sylvester Tran, "Polling Place and Non-Polling Place Voting" in *Unrigging American Elections* (Cham, Switzerland: Palgrave Macmillan, 2019), 81-83. *See also* California Executive Order N-64-20, https://www.gov.ca.gov/wp-content/uploads/2020/05/05.08.2020-EO-N-64-20-signed.pdf.

13 Andrew Menger and Robert M. Stein, "Choosing the Less Convenient Way to Vote: An Anomaly in Vote by Mail Elections," *Political Research Quarterly*, December 6, 2019, p. 106591291989000, doi.org/10.1177/1065912919890009 (citing Election Assistance Commission 2017).

B. The Rise of Vote-By-Mail in California

California has been a leader among states in expanding options and facilitating vote-by-mail. In 1979, California became the first state to allow "no excuse" absentee voting.[14] Voters were still required to apply to vote absentee on an election-by-election basis, but were not required to provide an "excuse" such as illness or travel plans.[15] In 2001, California expanded absentee voting by allowing California voters to register to vote absentee on a permanent basis in all elections, rather than having to request an absentee ballot for each individual election.[16] In 2007, California aptly renamed "absentee voting" to "vote-by-mail" (as "absence" had long since ceased to be a requirement for voting by mail).[17] By the November 2018 general election, 63% of California voters were registered as permanent VBM voters.[18]

In 2016, California passed the Voter's Choice Act (SB 450) ("VCA") which permits individual California counties to administer all elections as all-mail elections. Designed both to increase turnout and to reduce the costs of administering elections, the VCA was set to roll out across counties in stages, with full implementation by 2024. Now, in response to the pandemic, the California Governor has mandated by executive order that all California counties follow the VCA for the November general election.[19]

The VCA requires election officials in participating counties to mail ballots to all voters in the county, regardless of whether a voter previously registered to vote by mail or requested an absentee ballot. Voters can return their ballots several ways: by U.S. mail, at a specified ballot drop box, or in person at any vote center in the county. (By combining multiple precincts into a single site, a vote center enhances voters' convenience and lowers county administrative costs.) Counties that participate in the VCA have fewer vote centers than they would have with traditional precinct-based polling places, but voters can use any of them instead of having to vote from a specific polling place. They may vote any time during the early voting period or on Election Day. All vote centers are connected to the state's centralized voter registration database, so voters can confirm their registration status from any of them.[20]

Propelled by California's passage of no-excuse absentee voting, permanent vote-by-mail and most recently the VCA, the percentage of California voters voting by mail has steadily increased. The general election of November 2012 was the first presidential election in which a majority of votes cast in California were vote-by-mail ballots, and the percentage of voters voting by mail has continued to grow in each election since.[21]

---

14 "Improving California's Vote-by-Mail Process: A Three-County Study," Improving California's Vote-by-Mail Process: A Three-County Study (California Voter Foundation, August 2014), p.7, calvoter.org/votebymail.

15 Ibid.

16 Ibid. (citing CA Assembly Bill 1520 (2001)).

17 Ibid.

18 California Secretary of State, "Vote By Mail," sos.ca.gov/elections/voter-registration/vote-mail/ (See link to Registered Permanent Vote-By-Mail Statistics 1992 to 2018* (XLS) toward bottom of webpage).

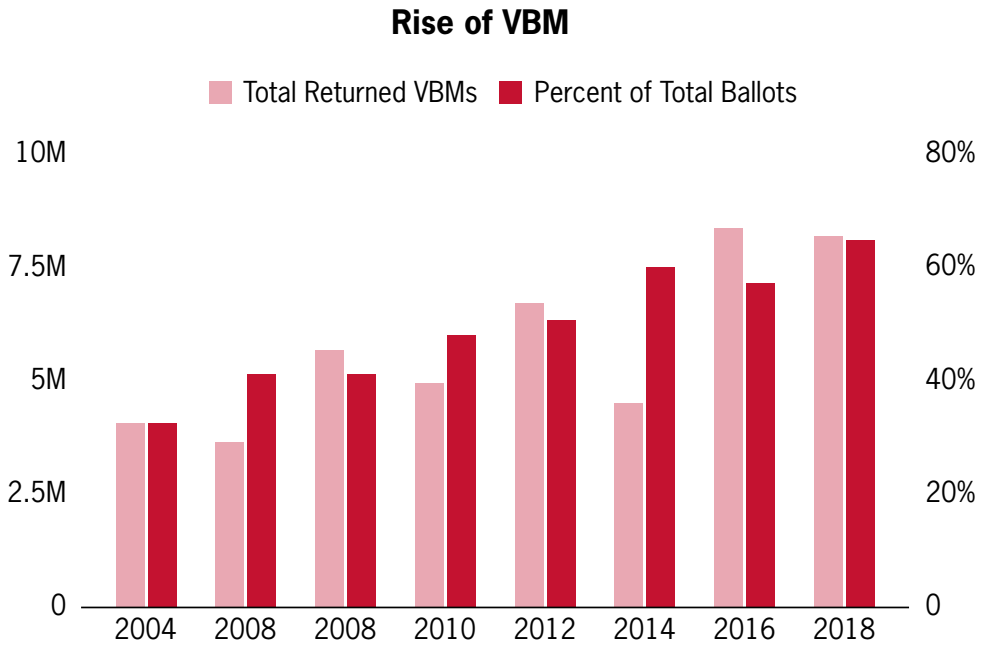
19 California Secretary of State, "About California Voter's Choice Act," https://www.sos.ca.gov/elections/voters-choice-act/about-vca/. See also Dari Sylvester Tran, "Polling Place and Non-Polling Place Voting" in *Unrigging American Elections* (Cham, Switzerland: Palgrave Macmillan, 2019), 81-83.

20 Ibid.

21 California Secretary of State, "Historical Vote-By-Mail (Absentee) Ballot Use in California," sos.ca.gov/elections/historical-absentee/.

FIGURE 1: Historic VBM Use in California Elections.

The increasing use of vote-by-mail in California, data from the Secretary of State.



C. Considerations Regarding Increased Use of Vote-by-Mail in California

The rapid rise of vote-by-mail in California and beyond has drawn expected scrutiny concerning its administration. Scholars and election officials commonly cite several advantages to the vote-by-mail process. Most obvious is the increased convenience and flexibility for voters who can take all the time they need in the comfort of their home to complete their ballot. It can also reduce wait times at polling places and can reduce the costs of election administration.[22] Finally, recent research suggests a moderate increase in voter turnout associated with vote-by-mail in certain elections, presumably as a result of the increased flexibility for voters.[23]

Recent research suggests that voting by mail generates a moderate increase in voter turnout, presumably as a result of increased flexibility for voters.

22 Dylan Lynch, "All-Mail Elections (Aka Vote-By-Mail)," (National Conference of State Legislatures), www.ncsl.org/research/elections-and-campaigns/all-mail-elections.aspx.

23 Ibid. *See also* Kevin E. Henrickson and Erica H. Johnson, "Increasing Voter Participation by Altering the Costs and Stakes of Voting*," *Social Science Quarterly* 100, January 24, 2019, no. 3: 869-884, https://doi.org/10.1111/ssqu.12583. Alan S. Gerber, et al., "Identifying the Effect of All-Mail Elections on Turnout: Staggered Reform in the Evergreen State," *Political Science Research and Methods* 1, no. 1 (2013): 91–116. doi:10.1017/psrm.2013.5. Daniel M. Thompson, et al., The Neutral Partisan Effects of Vote-by-Mail: Evidence from County-Level Roll-Outs, April 14, 2020, http://www.andrewbenjaminhall.com/Thompson_et_al_VBM.pdf. Notably, Thompson, et al., find that the slight increase in overall voter turnout does not affect either party's vote share or share of turnout.

But vote-by-mail also has raised a variety of concerns. It can slow down the vote count and increase the amount of time it takes to certify an election.[24] At-home voters could be more susceptible to pressure from family members.[25] And there are a significant number of votes lost in the vote-by-mail process that might not be lost at traditional polling places. For example, not all requested vote-by-mail ballots actually make it to the voter. A significant number of vote-by-mail votes are rejected for errors such as over-voting or incorrect completion that might have been detected and fixed in person. Lastly, many vote-by-mail ballots are rejected for missing or mismatched signatures.[26] In the 2012 general election, 23% of uncounted vote-by-mail ballots in California were rejected due to mismatched signatures.[27]

Vote-by-mail ballots are rejected for missing or mismatched signatures. In the 2012 general election, 23% of uncounted vote-by-mail ballots in California were rejected due to mismatched signatures.

Another set of concerns around vote-by-mail relates to preserving election integrity and voter confidence in the process. When a voter votes from home, they are doing so outside the supervision of election officials, and there theoretically are opportunities for foul play. These opportunities take place throughout the chain of custody of the ballot, beginning with how a voter requests a ballot and then receives, completes, and returns it.[28] While documented cases of vote-by-mail voter fraud are rare, scholars agree that voter fraud is more prevalent in vote-by-mail than it is for in-person voting.[29]

D. Signature Verification and the EVCA

To guard against voter fraud, California's election code requires signature verification for votes cast by mail. Each vote-by-mail ballot includes a return envelope, which a voter must sign to authenticate their identity. Upon receipt of the ballot return ID envelope from the voter, election officials (often including temporary workers hired during election season) are required to compare the signature on the return envelope to one or more of the voter's signature(s) stored by the county in the voter's voter registration file. Until late 2018, the California Elections Code provided that if election officials determine that the signature on the return envelope does not match the signature(s) on file for that voter (specifically, if the two "do not compare"), they may not process the vote.[30]

In the 2016 general election, tens of thousands of mail-in votes across California were not processed because election officials determined that the ballots' signatures did not match those on file.[31] Some

---

24 Ibid.

25 Ibid.

26 Stewart, "Adding Up the Costs and Benefits of Voting by Mail," *Election Law Journal: Rules, Politics, and Policy* 10, (November 3, 2011) no. 3: pp. 297-301, doi.org/10.1089/elj.2011.1034. *See also* Stewart, "Losing Votes by Mail." *New York University Journal of Legislation and Public Policy* 2010. 13 (3): 573–602.

27 UC Davis Center for Regional Change / California Civic Engagement Project, "California's Uncounted Vote-by-Mail Ballots: Identifying Variation in County Processing," (September 2014), http://static1.squarespace.com/static/57b8c7ce15d5dbf599fb46ab/t/5881a1622994ca06fb1484ac/1484890469869/CCEP+VBM+Issue+Brief+2+Revised+%281%29.pdf.

28 MIT Election Lab, "Voting by Mail and Absentee Voting," https://electionlab.mit.edu/research/voting-mail-and-absentee-voting.

29 Ibid.

30 California Elections Code Section 3019(c)(2) (2016).

31 Dave Tartre, "California Trashes Thousands of Mail-In Ballots, ACLU Says," *Courthouse News Service*, courthousenews.com/california-trashes-thousands-mail-ballots-aclu-says.

The LaFollette Court noted "several reasons a person's signature may differ on two occasions: physical disability, injury, a primary language that does not use Roman characters…or simply the passage of time."

studies showed that minority voters' ballots were rejected at higher than average rates.[32] In 2017, the ACLU filed a lawsuit against the California Secretary of State on behalf of one such disenfranchised California voter.[33]

On March 5, 2018, in *La Follette v. Padilla*, the Superior Court of California sided with the ACLU and held that the due process clauses of the state and federal constitutions are violated when California voters are disenfranchised for signature mismatch without notice and an opportunity to cure.[34] The Court found that between 33,000 to 45,000 votes had gone uncounted, despite no evidence that a significant number of the rejected votes resulted from fraud. The Court noted "several reasons a person's signature may differ on two occasions: physical disability, injury, a primary language that does not use Roman characters…or simply the passage of time. Many Californians register to vote on computer touch pads, yielding signatures that differ in appearance from those made on paper ballot envelopes."[35] The Court's order prohibited California from rejecting any more votes on account of mismatched signatures without first providing the voter notice and an opportunity to cure.[36]

In response to the *La Follette* ruling, the California legislature passed the Every Vote Counts Act ("EVCA") in September 2018.[37] The EVCA requires election officials to notify a voter at least eight days prior to the certification of an election of a determination that their signature does not match. The voter must then be given an opportunity to "cure" the mismatch by returning a signature verification statement affirming that the signature belongs to the voter, no later than 5:00 PM two days prior to the certification of the election.

The Every Vote Counts Act requires county election officials to notify voters, and allow to remedy, a signature that does not match or is missing from the ballot ID envelope.

32 Asian Americans Advancing Justice, "Asian Americans Face Higher than Average Vote-By-Mail Rejection Rates in California," https://www.advancingjustice-la.org/sites/default/files/issuebrief-vbm-FINAL-1.pdf.

33 *La Follette v. Padilla*, 2018 WL 3953766 (2018).

34 Ibid., *3.

35 Ibid., *1.

36 Ibid., *3.

37 California Senate Bill No. 759 (amending Section 3019 of the California Elections Code) (filed Sept 17, 2018) https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180SB759. Amended by California Senate Bill No. 523 (amending Sections 3019 and 2194 of the California Elections Code) (enrolled Sept 16, 2019) http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201920200SB523.

The California Elections Code, however, still leaves many areas of this process undefined. For example, it says little about the criteria or standard of review that election officials should use when comparing signatures, the need for any specific handwriting expertise or training of elections workers involved in signature comparisons, the permissible scope of the role of automated technology in the signature verification process, or the precise manner by which election officials may contact voters to notify them of a mismatch or accept their signature verification statements. As a result, each California county has developed its own practices and procedures regarding these questions.

About This Study

The purpose of this study is to understand how California counties (1) verify signatures on vote-by-mail ballot return ID envelopes against voters' registration files; (2) notify voters whose signatures were rejected due to a mismatch; and (3) allow them an administrative process to remedy or "cure" this rejection, as mandated by the EVCA.

This study seeks to present a systematic account of the signature verification process throughout California with the hope of describing alternative approaches that may be of use to election officials and of interest to the general public. We hope making this information readily available will raise public awareness of how vote-by-mail ballots are processed in California and equip policymakers with a better understanding of how counties are performing these key electoral functions. Finally, we will recommend needed improvements to those processes geared toward (1) voters, (2) county election officials, (3) the Secretary of State's office, and (4) legislative recommendations for the California State Legislature.

The information in this report is the product of discussions with multiple national election administration experts and election officials from thirty-three of California's fifty-eight counties. Together, these counties include over thirty-two million people, more than 80% of the state's population. We began our work with a series of scoping interviews to understand the key pain points and political dynamics that affect different signature verification regimes in California. From these initial conversations, we created a standardized survey instrument to gather qualitative and quantitative data about counties' signature verification processes and their implementation of SB 759, the Every Vote Counts Act. County registrars participated in a phone, video, or in-person interview. In a few cases, when timing and resources were limited, counties responded to the survey via email. Summaries of these interviews are available in "County Fact Sheets," *Appendix II*. Specific quotations from these interviews are anonymized and attributed in the text according to the general size of the county.

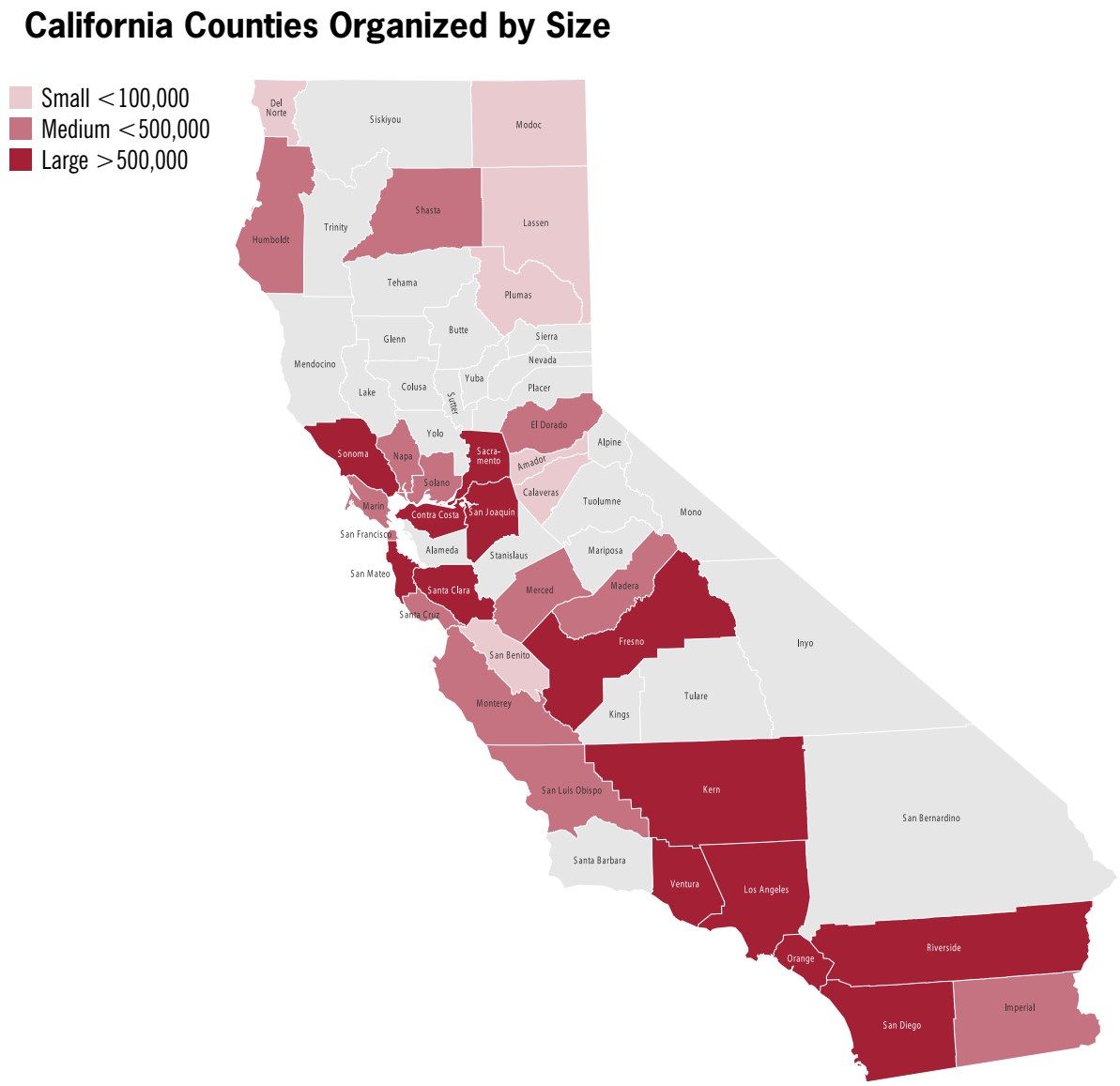
To assess the effects of the EVCA and other reforms on VBM rejection rates and the share of those rejections from signature mismatches specifically, we also examined data from the Election Administration and Voter Survey ("EAVS") performed by the Election Assistance Commission (EAC).[38] The EAVS is the most comprehensive database on election administration derived from nearly 6,500 local jurisdictions. It contains information regarding all sorts of election administration topics including voter registration, provisional ballots, voter participation, election technology, and most relevant for our purposes, mail voting. We examined EAVS data for all California counties from 2004 to 2018, including VBMs returned and submitted for counting, VBMs returned but not counted, and VBMs

38 Election Assistance Commission, *2018 Election Administration & Voting Survey,* https://www.eac.gov/research-and-data/election-administration-voting-survey.

rejected for signature mismatch issues among other reasons (missing signature, missed deadlines, etc). About 75% of the available data contained signature mismatch information. Using our interview data, we have coded additional variables for counties' use of automation (i.e., algorithmic matching systems, rather than solely optical scanners and sorters to facilitate manual review), levels of review, use of entirely VBM elections,[39] and forms of notification used to remedy signature mismatches.

FIGURE 2: Map of California with Counties Surveyed and Categorized by Size

Surveyed Counties are highlighted in green (33 in total). Not easily seen due to size: the City and County of San Francisco. Note that these counties are categorized by county population, not the total number of registered voters residing in the county.



39 Data on entirely VBM counties was publicly available, hence our quantitative analysis for this variable applies to all counties rather than just those we interviewed.

Methodology

A. Project History

This report is the product of ten months of deliberations, scoping, and research. In early 2019, the Stanford Law School Election Law Project ("ELP"), a student interest group, conducted a series of discussions with its membership regarding what the group hoped to accomplish in an odd-numbered year with few major elections. Small teams conducted preliminary research to determine whether there was actionable work available in fields ranging from in-person voter registration to electronic voting. One group read the California Voter Foundation's 2014 study "Improving California's Vote-by-Mail Process: A Three-County Study."[40] As the centerpiece of its 2019 work product, ELP's membership voted to develop a project that extended the California Voter Foundation's study. The ELP project responded not only to the growth of vote-by-mail in California but also to SB 759, the Every Vote Counts Act, which passed into law in September 2018, making the topic uniquely compelling. ELP leaders began developing the plan for a research project scoping the legal and political dynamics around signature verification and the notice and remedy process where a mismatch is found. Under the aegis of the Stanford Law and Policy Lab, a program for experiential learning and policy incubation, the research project took shape as an accredited law school course entitled the "Every Vote Counts" Voter Verification Project (Law 806Z), staffed by an interdisciplinary team of ten students and faculty.

B. Interviews with County Registrars of Voters

We sought to understand the challenges that California county registrars face in verifying VBM signatures and complying with and implementing the EVCA. To do so, teams of students reached out to the 58 county registrars that manage elections in California. Over the period between October 2019 and January 2020, we conducted semi-structured interviews with 33 election officials from counties that represent over 80% of California's population.

Based on these interviews, we mapped the trajectory of vote-by-mail ballots from receipt and signature verification at county election headquarters to, where necessary, voter notification and signature remedy. Our extensive interviews surfaced the key issues that registrars face in verifying a voter's signature, the scale of challenged ballots, and the range of notice and remedy processes. This helped us gauge how counties manage signature verification and the remedial steps counties are taking under the EVCA to allow voters to remedy signature mismatches within the statutory deadline.

We also conducted informational interviews with other stakeholders (i.e., national experts in election systems and performance, election directors from other states, and voting rights litigators), and collected administrative materials from California election officials and public records from the U.S. Election Assistance Commission (EAVS), to inform our understanding and review of California counties' implementation of the EVCA.

40 Kim Alexander & Saskia Mills, "Improving California's Vote-by-Mail Process: A Three-County Study," *California Voter Foundation*, August, 2014.

The questions for these semi-structured interviews were the product of many iterations. To inform our thinking, we reviewed Colorado's signature verification guide and hosted a video teleconference with Judd Choate, Colorado's elections director. Then, we outlined goals for the project and brainstormed questions to fulfill those goals. After robust debate, we agreed on fundamental premises that would guide our questions. First, the goal of election administration generally should be for as many eligible voters for cast ballots as possible. Second, we would be alert for evidence suggesting that signature verification processes were disproportionately harmful to marginalized groups. Finally, voters are more likely to benefit from a transparent signature verification regime that lays out specific guidelines for how officials should evaluate mail-in ballots.

There are no doubt alternatives to this approach: For example, inadequately detailed written verification guidelines could take flexibility away from registrars who may find themselves unable to avoid challenging an obviously valid signature. On the other end of the spectrum, guidelines could be too detailed and confusing to be a good substitute for human intuition and the "common sense test." That said, these foundational principles are a reflection of our conversations with practitioners in the field and important legal principles like due process and equality before the law.

We then organized questions into two themes, the signature verification process and SB 759 implementation. We shared a distilled draft of the questions with MIT Professor Charles Stewart III, a leading expert on election administration. Questions related to the signature verification process covered: (1) the VBM ballot signature verification process, evolution of process, and challenges; (2) signature verification training process; (3) machines or software used to verify signatures; and (4) known or perceived fraud with VBM ballots. Questions related to the implementation of SB 759 focused on: (1) the process for contacting voters upon a determination of signature mismatch; (2) the ability of a voter to appeal a finding of a signature mismatch; (3) experiences and challenges with implementation of the EVCA in the 2018 election; and (4) coordination with the Secretary of State and/or other counties in EVCA implementation.

We piloted these questions in interviews with five counties and then refined them for quality, scope, detail, and clarity to create a final interview protocol. These five counties were chosen according to the following criteria: (1) variety, (2) receptiveness and a willingness to offer feedback on the questions, and (3) counties detailed in the California Voter Foundation's VBM report. Upon completion of the final survey instrument, we began interviewing as many of the 58 California counties as possible. The research team of law, graduate, and upper-division students was divided into five groups of two to three members. Each team was assigned approximately 10 (of California's 58) counties to interview. We contacted county registrars by email, and scheduled phone interviews (30 minutes - one hour each). In five instances, the entire research team of 14 students and advisers collectively conducted interviews via phone or video teleconference. A handful of interviews were completed over email, where county officials filled out scoping questions on their own time and participated later in a follow-up call. One interview was conducted in person with a registrar for a large, urban county and her Vote-By-Mail Manager. Other counties did not respond.

After each interview, we completed a spreadsheet to organize data collected by the following categories:

1. Geographic location of county: NW, NE, Bay Area, Sacramento Area, Central, SW, SE
2. Community type: Rural, suburban, or urban
3. Population of county: Large > 500,000, Medium <=500,000, Small <=100,000
4. Process of signature verification process
5. Training/staffing of signature verification process
6. Automated processes of signature verification process
7. Criteria used to verify signatures
8. Role of observers
9. Timeline of signature verification process
10. Ballot return ID envelope design
11. Notification process: e-mail, phone, in-person, mail, social media, other
12. Remedy process
13. Remedy used/accepted: e-mail, phone, in-person, mail, other
14. Distinguishing features about county processes

Location, Population, and Size (categories 1-3): Counties have been anonymized through the use of broad attributes to describe location, community type, and population size. County locations have been defined by general region in California (e.g., southeast, northwest). Community type is classified as rural, suburban or urban. Rather than listing the exact number of residents, county population is defined as small (less than or equal to 100,000 people), medium (less than or equal to 500,000 and more than 100,000 people), and large (more than 500,000 people). This resulted in approximately one-third of counties in each sub-category.

C. EAVS Survey Results

Our analysis of EAVS data uses difference-in-differences panel regressions along with variables coded from our interviews on county procedures (the "panel" being annual data at the county level)—analyzing how automation or the switch to entirely VBM elections affect VBM rejection rates and mismatches as a share of those rejections. Difference-in-differences regressions exploit variation within counties (*i.e.,* changes in policy over time regarding automation or fully vote-by-mail elections) to quantify relationships to dependent variables. We control for county and time fixed effects—accounting for the possibility that different years have different patterns, high or low, across all counties or that different counties have different patterns, high or low, across all years—to contain the effect to our independent variables of interest.

Seven of the counties we interviewed switched to automation during the years of our dataset, while eight others introduced fully VBM elections, the latter partially augmented by implementation of the Voter's Choice Act. Data on counties both before and after policy reforms provides immense variation for our models, enabling us to compare these treatment counties to control counties that make no change.

It was more difficult to determine the effect of the EVCA, levels of review, and remedy notification methods due to lack of variation or years of data. After the EVCA, all counties were mandated to lengthen their remedy period and provide formal notification for signature mismatches in 2018, hence we lack a control and treatment group—every county was in the treatment group. That said, we can examine the 2018 year variable relative to prior years, combined with the perceived effects of online voter registration from the New "Motor Voter Act," and create estimates on the impact of the EVCA's lengthened ballot defect notification period.

No county changed their levels of review, the tiers required before a ballot is challenged and a voter formally notified, during the years of our data. In other words, when we do not observe intra-county variation in levels of review and procedures, any changes in rejection rates or signature mismatches from year to year can be equally ascribed to county fixed effects (i.e., distinctions across counties) rather than changes in procedure (distinctions *within* counties). Since no county indicated changes to its procedures between 2004 and 2018, it may be true that counties with additional levels of review are simply more likely to remedy defective ballots.

Finally, through our interviews we gathered new data that exists because of the EVCA: the number of voters notified of a signature mismatch issue (which most counties generally referred to as "challenged ballots," although some only use that title when the ballot has fully been rejected), the remedy rate within those challenged ballots, and forms of notification used to notify voters. Counties did not compile this data prior to the EVCA, so we only have a limited number of counties for 2018, but the summary statistics provide a striking portrait of solutions for signature mismatches.

The quantitative results are included in the aggregated findings section below, and the regression tables are included in *Appendix IV* for those seeking additional detail.

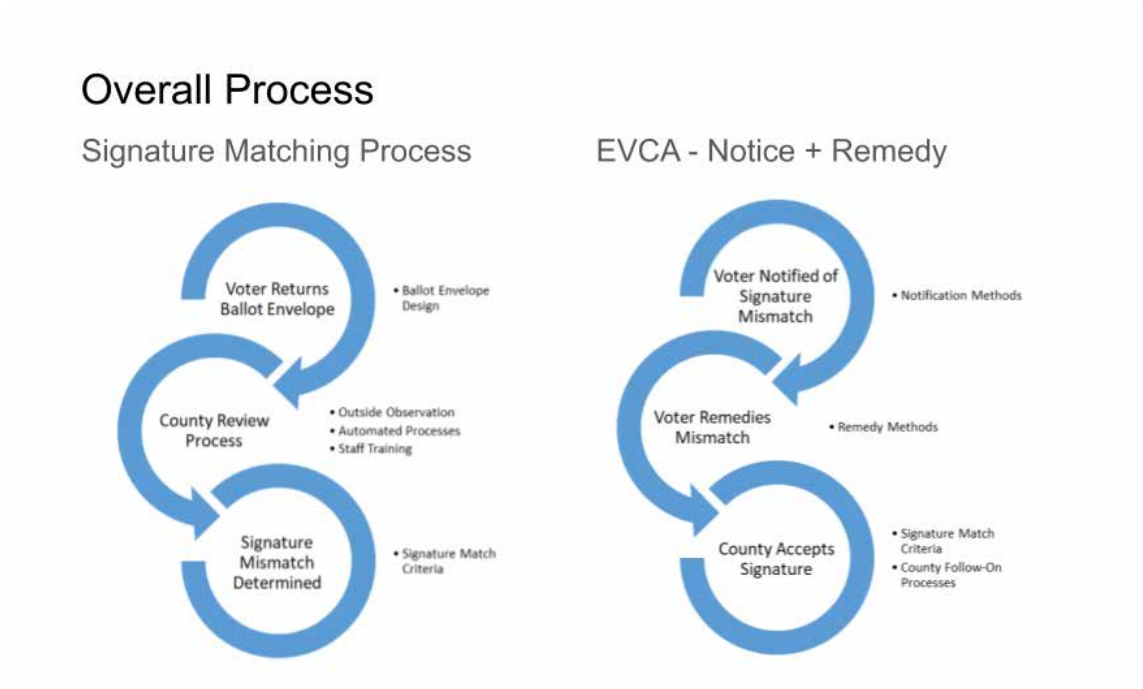
AGGREGATED FINDINGS

Introduction

This section outlines our collective findings regarding both (1) signature verification processes and (2) county implementation of the Every Vote Counts Act's notice and remedy requirements. Within the signature verification processes, we examined (1) ballot return ID envelope design, (2) the use of automated processes, (3) training and staffing, and (4) outsider observer access. In developing these findings, we attempted to identify the practices followed by the majority of counties we surveyed, as well as minority and outlier practices. These practices are illustrated by examples from specific counties. *Figure 3* outlines the overall process in how an elections office receives and processes a ballot, from signature verification to notification and remedy.

FIGURE 3

Overall process from the time an elections office receives a ballot, verifies the signature, and moves through notification and cure.



Signature Verification

A. Ballot Return ID Envelope Design

Counties send each vote-by-mail voter a return envelope along with their ballot for each election. The return envelope in which a voter encloses his or her ballot includes a box where the voter is required to affix their signature. Elections officials use the signature to verify the voter's identity before they unseal the envelope. This enables the county to separate the signature verification process from the voter's political choices on the ballot, protecting voter privacy and shielding the voter from politically motivated discrimination. Ballot return envelopes therefore play a vital role in the vote-by-mail electoral process, and poorly designed ballot return envelopes can confuse or unintentionally disenfranchise voters. (See *Appendix II* for images of ballot return ID envelopes across counties.)

California law requires ballot return ID envelopes to display only a warning that "the voter must sign the envelope in his or her own handwriting in order for the ballot to be counted."[42] Beyond this, there are no standardized requirements for ballot return envelopes in California, and counties have wide latitude to make their own designs. However, the California Secretary of State's office, in partnership with the Center for Civic Design, created a template ballot return ID envelope that works for all stakeholders—voters, election officials, and the U.S. Postal Service—with the express purpose of reducing the number of ballots that are not counted or require corrections.[43] The Secretary of State's office has strongly encouraged counties to adopt this design.

Ballot return envelopes play a vital role…and, when poorly designed, can confuse or unintentionally disenfranchise voters.

Our interviews revealed that ballot return ID envelope designs vary quite a bit. While many counties choose to follow the Secretary of State's guidelines and have implemented the Center for Civic Design's template, a significant minority either design their own envelope or outsource the design to a third-party vendor. Four counties in our sample outsourced their design to various third-party vendors. And even among counties that do use the Center for Civic Design's templates, designs vary as counties have modified their individual ballot return ID envelopes to fit their needs and preferences.

However, though California ballot return ID envelopes continue to vary in layout, wording, content, size, and color, these inconsistencies may be of limited practical significance, as we did not identify a strong correlation between these elements and the percentage of rejected vote-by-mail ballots.

---

42 California Elections Code § 3011(a)(7).

43 *Vote-by-Mail CA Envelope Design* (available at elections.cdn.sos.ca.gov/vote-by-mail/pdf/guidance.pdf).

B. Typical County Signature Review Processes

Each county official we spoke to described a specific process by which their elections departments evaluate VBM ballot signatures. These processes typically involve a series of steps in which staff members (and sometimes software) evaluate and, when necessary, challenge ballot signatures by comparing the ballot return ID envelope signature to one or more of a voter's signatures on file. Counties throughout the state implement a variety of systems to process signatures.

Many counties implement a tiered process that requires multiple staff members to "sign off" on any "challenged" signature (e.g., a missing signature or mismatch). The evaluation process begins with temporary or junior elections staff, but the power to make a final decision to designate a signature as a mismatch rests with the Registrar, Assistant Registrar, or another senior staff member. Most counties have explicit hierarchies in place for staff to review and evaluate challenged signatures, each with different policies about staff access to signatures on file that may be used to verify a voter's ballot signature. Some larger counties have used a multi-tiered review process for many years. In others, such as Modoc County, two full-time staff members evaluate all voter signatures for each election. Other counties implement a multi-tiered process in which one senior staff member, such as the Registrar, serves as the final decision maker for all challenged signatures. In Imperial County, on the other hand, if the Registrar is unsure whether the signature matches, the entire staff of three to five people comes together to discuss the challenged ballot until reaching consensus.

Counties have explicit hierarchies in place for staff to review and evaluate challenged signatures, each with different policies about staff access to signatures on file.

Some more populous counties, such as Los Angeles or Merced, begin the verification process by passing sealed ballot return envelopes through an automated system. In these counties, staff members always manually examine all signatures flagged by the algorithmic scanners as possible mismatches. Some other counties, however, limit the access their machines have to use comparison signatures. For instance, in Sonoma County, the machine compares the sealed envelope ballot signature only to the voter's original voter registration signature. When Sonoma staff members check the signatures the machine has flagged, however, the staff members have access to additional signatures on file, including those from a voter's previously signed VBM envelopes, remedy forms, ballot requests, and change of address notices. Ventura County, on the other hand, does not limit the comparison signatures their automated system can use, giving it access to an array of signatures for individual voters.

Procedurally, the vast majority of counties take an assembly-line approach to matching signatures. If the initial reviewer cannot find a match, they elevate the ballot to a second reviewer, and mismatches found by that reviewer are elevated to senior department staff or the Registrar for a final review before the ballot signature mismatch is confirmed. In many cases, the second and subsequent levels of review will look at a wider range of signatures on file or use a broader set of matching criteria than the first review to increase the likelihood of finding a match. For example, in many counties, the first reviewer will compare the ballot signature only to the voter's registration signature or the voter's most recent signature on file, while subsequent reviewers compare the ballot signature to all signatures that the department has for the voter.

Counties that limit access to the full range of signatures on file to more senior officials, excluding temporary staff, tended to be larger operations. In these counties, when a challenged ballot reaches a senior official, that person may review the ballot return ID envelope as well as various other signatures on file with the county. In the City and County of San Francisco, temporary, seasonal staffers are the first to examine a voter's signature. They compare it only to the voter's affidavit of registration and other signed forms the voter has previously submitted. However, if temporary elections staff challenge a signature, permanent staff can compare the signature to signatures on previous VBM ballots and other state-level registration records from outside the county. Santa Clara County uses a multi-tiered process where, for example, temporary workers can only see a voter's most recent signature. Permanent staff members who review signatures challenged by temporary workers may use all signatures on file for a voter, including the signature attached to the VBM application or the voter's original registration application. They also examine the physical envelope, rather than just a scanned copy. If the permanent staff member upholds the challenge, the ballot goes to an even more senior staff member for additional review. In El Dorado County, after being evaluated by an automated system, the first group of staff members to examine the challenged signatures have access to the voter's signature on their voter registration card. Meanwhile, at the third level of evaluation, staff members will look for other signatures for comparison. This practice of tiered review appears to be designed to save time and secure a voter's privacy in the early review stages when reviewers must move rapidly through ballots. It also defers final decisions to designate a signature as a mismatch to more senior and experienced staff members after more thorough review and analysis.

A significant number of signature mismatches come from voters in the same household signing each other's envelopes by mistake.

In sum, all counties have established procedures for verifying signatures, and most use a multi-tiered process, with senior staff members as the final decision-makers for the final designation of signature mismatches. Within these systems of review, however, the sources of signatures used for comparison purposes vary significantly. The personnel and machines involved in these processes vary as well.

A couple of intriguing trends merit consideration. First, many registrars noted that a significant number of signature mismatches come from voters in the same household signing each other's envelopes by mistake. To address this issue, several county officials say they also look at other household members' envelopes when verifying a challenged signature. Second, several county officials use electronic signatures collected by the DMV in the verification process. The poor image resolution of DMV signature pads and the lack of uniformity in the signatures generated make verification more difficult. The quality issues with these DMV-generated signatures leave election personnel in each county to determine their own standards for how to use them to verify mail-in ballots.

FIGURE 4: Photo of Signature Verification Screen

NPR, "Sign Here: Why Elections Officials Struggle to Match Voters' Signatures," npr.org/2018/11/17/668381260/sign-here-why-elections-officials-struggle-to-match-voters-signatures. *Note that this is a Utah elections office using equipment and processes similar to those found in many California counties.*

C. Verification Criteria and Standards

California election law does not include many specific standards to verify the signatures on mail-in ballots. The Elections Code mandates a few basic rules: restricting registrars from identifying a mismatch when a voter uses their initials instead of their full signature,[44] and requiring a human to verify any electronically identified mismatch.[45] Yet county registrars have a relatively free hand in setting their own protocols to determine the validity of mail-in ballots. As one elections scholar pointed out, some flexibility enables registrars to exercise their judgment on ballot signatures that are rendered in good faith by the voter, sometimes in ways that are difficult to anticipate. At higher levels of review for challenged signatures, nearly all county officials agreed that a qualitative standard is better at evaluating edge cases. Thus, this report argues that heightened standardization across counties is useful in phase one evaluation of a signature and that qualitative human review is a valuable means of ensuring higher rates of accuracy in verifying challenged voter signatures.

The review process typically takes place on a screen where the reviewer examines the signatures of up to four voters at a time. The photo below, from an NPR story, shows the screen that an examiner sees.

Thus, the criteria and standards that counties use to match signatures are at the heart of the verification process. In deciding what criteria to use, counties make fundamental policy decisions about how skeptically to judge signature discrepancies, whether to base their review on formal or informal guidelines, and whether to emphasize personalization or standardization in their matching procedures. Moreover, counties typically employ multiple levels of review for any ballot signature that is flagged as a potential mismatch. As a result, registrars set different policies for each of these issues at different levels of review.

Most counties review ballot signatures with a basic presumption in favor of counting each ballot. County officials express this presumption through various policies: many instruct evaluators to look for "similarities, not differences," while others declare that just three or even one matching characteristic between the ballot signature and the comparison signature will be sufficient to find a match. Some counties express this principle as an abstract guideline. The assistant registrar of one mid-sized, rural county explained that the matching process is "very liberally construed in favor of the voter," and an official from a large county in southern California similarly expressed that the county's philosophy is to "go in favor of the voter" by proactively finding matches and not looking to reject ballots.

Most county election offices construe ballot envelope signatures according to abstract guidelines 'in favor of the voter.'

The few counties that differed from this presumption generally did so only in the first level of review of a given ballot signature. The registrar of one coastal county characterized the department's first review as "conservative." Evaluators are instructed to refer the ballot for further review if there is any question about the comparison or if it takes longer than three seconds to determine that the signatures match. But, starting at the second level of review, the county's staff are told to look for signature similarities in an effort to find a match. On a similar note, while the registrar of one mid-sized county in northern California said that first-round reviewers are instructed to elevate the ballot to a supervisor if they cannot match the signatures in a few seconds, the registrar also said that the county's evaluation process on the whole looks for comparisons, not perfect matches, and aims to give voters "the benefit of the doubt." In general, counties differ in whether they treat their second-level review as an opportunity to clear up uncertainties or as a re-evaluation of a ballot that was challenged by the initial review; counties that use the former structure are more likely to employ conservative standards for their first level of review.

The majority of counties compare a set of enumerated characteristics of the ballot signature to one or more signatures on file to determine whether they match. These characteristics vary in their number and specificity, and they also vary as to whether they are captured in a written policy or transmitted less formally during training. Common characteristics that counties compare during the matching process are the slant of the handwriting, the shape of letters and loops in the signature, the way that "T's" are crossed and "I's" are dotted, and the signature's initial and ending marks. Other commonly assessed characteristics are the spacing and size of letters and the consistency of any unique characters in the signature. The Colorado State Signature Verification Guide, for example, explains the types of features that county officials in that state look for when they examine a voter's signature. See *Figure 5* following.

FIGURE 5: Images of Signatures from Colorado Secretary of State Signature Training Guide

Selections from Colorado Secretary of State, Signature Verification Guide, Version 2.1, 9-13-18.

A minority of counties evaluate the signature as a whole, rather than looking at any particular elements of the signature. For example, the registrar of a mid-sized county in northern California explained that matching is a "common sense" process that only requires looking at a signature in its entirety. Furthermore, the registrar of a large county in southern California also said that the county emphasizes general guidelines over specific criteria for comparison. Although fewer small counties have created a written policy articulating the criteria they use to evaluate signatures—potentially due to resource constraints—the divide between counties that evaluate signatures holistically or by reference to specific criteria does not map to county size. Some of the state's most populous counties review signatures under general guidelines, and some of its smallest use specific criteria to match signatures.

There is no consensus among counties on whether to include an assessment of the possible reasons for signature variations in their review. Representatives from several counties we interviewed said that they consider the voter's age and the amount of time that has elapsed since the comparison signature was recorded. When it appears that the signatures on file are not a close match because the voter's hand has become "shaky" with age or because they have changed their signature over time, these counties may allow the ballot to be counted. Other counties do not follow this approach. Uniquely, one county official suggested that evaluating the explanation for signature discrepancies was outside

One county official explained that mismatches happen "for lots of different reasons…. We don't try to examine the reasons. We try to examine the signature."

"I cannot compare a printed name to a signature," complained an official who lamented the decline of teaching cursive in school.

her department's purview: she explained that mismatches happen "for lots of different reasons…. We don't try to examine the reasons. We try to examine the signature."

A few low-population counties with just a few full-time staff members employ a more individualized and investigative process. Amador County, for example, charges both of its full-time elections department staff members with evaluating all ballot signatures (in high-volume elections, a third temporary staff member reviews ballots as well, but is told to call one of the permanent staff members if they have any difficulty matching a signature). These officials use a highly personalized process, looking for similarities across a broad range of specific and informal criteria, and comparing the signature against every signature that the department has on file for the voter. If the staff member first assigned the ballot is unable to come to a decision, both staff members get together to check the signature and make a collective judgment. Another small county in southern California also brings the department as a whole together to examine challenged signatures; the team compares a signature to anything the county may have on file to look for any similarities. This county relies on institutional practices and common sense rather than codified rules to verify signatures.

Finally, many county officials expressed that evaluating ballot signatures is made substantially harder by the decline of cursive education and by the use of electronic signature pads during DMV registration, which often produce blurry signatures or flatten otherwise distinctive elements of a signature. Both issues disproportionately affect younger voters, who are more likely to have registered on an electronic signature pad and are less likely to have learned cursive in school. The registrar of one Bay Area county explained that she "cannot compare a printed name to a signature," and that people printing rather than signing their names on their ballots is "becoming more prevalent over time." The assistant registrar of a county in the Central Valley expressed concern that young people without cursive education are signing their voter registration materials with "smileys and hearts" that disappear from their signature as it develops, leading to mismatches.

D. Automated Processes

In some counties, automated technology plays a central role in the signature verification process. Automated mail sorters streamline VBM ballot processing by automatically sorting incoming ballot return ID envelopes based on envelope thickness, weight, and precinct. Once sorted, ballot return envelopes are often scanned by industrial-scale electronic scanners, which can process high volumes of signatures in a fraction of the time it would take to do so manually. For example, the ES&S (Election Systems & Software) Mail Ballot Verifier (MBV) machine scans and logs at a rate of 100 ballots per minute. These scanners capture and store a digital image of every ballot return envelope. From this image, voters' signatures are isolated, allowing for quick human comparison or additional automation.

A smaller number of counties also use automation to verify signature matches. Signature verification technology compares the image of the signature on the ballot return envelope against images of signatures in that voter's file. This is typically done using algorithms that look for a certain number of points of similarity between the compared signatures. If the signature meets a set confidence threshold—that is, if the algorithm determines it is similar enough to the signature on file—the ballot is marked as verified, eliminating the need for a manual review. California law requires election officials to visually inspect any ballot return envelopes or signatures that are challenged by the automated scanners.[46]

Both federal law and California law regulate the use of electronic voting systems in the electoral process.[47] However, automated scanners—including both the hardware and software used to verify voter signatures—fall outside of the scope of these regulations, and are therefore not subjected to any special election-related scrutiny by federal or state regulators.[48]

Automated scanners used to verify ballot ID signatures are not regulated. They fall outside the scope of federal and state regulations for electronic voting systems.

Whether a county decides to use automatic signature verification seems to depend in large part upon the volume of ballots processed and the trust in automated technology. Larger counties with more ballots to process tend to incorporate an automatic signature verification step—three out of the four most populous California counties do so. This generates savings and improves efficiency when there are millions of ballots to process quickly to meet the election certification timeline. One county official noted that they were considering introducing automated signature matching in the future because of the "ever-increasing volume of VBM." Four counties backed up automatic signature verification with staff to check every ballot, regardless of what the algorithms predicted. Another county official mentioned the need to "double it up" with "human eyes on every ballot," showing an attitude of general mistrust toward automated matching algorithms and other technological replacements for human involvement.

Most other counties just use automated tools to process, scan, and display ballots for a human to then compare side-by-side with the signature on the voter's record. For these counties, only the mechanical processes of scanning and sorting are automated, allowing humans to maintain control over the more consequential decision of judging the validity of ballots. Counties that do not use any automation at all are generally less populous with smaller operations. The lower volume of ballots in these counties makes it possible for one or two staff members to process everything without a scanning or sorting machine.

46 California Elections Code § 3019(a)(3).

47 S*ee generally, Help America Vote Act of 2002*, 52 U.S.C. §§ 20901-1145; California Elections Code §§ 19001-402.

48 California Secretary of State, California Voting System Standards, Oct. 2014, elections.cdn.sos.ca.gov//pdfs/california-voting-system-standards.pdf (outlining regulations for voting technologies in California, and not referencing automated signature scanners).

A variety of different brands of machines are used for automation processes when handling VBM ballots—including ES&S, Olympus, Vantage, Pitney Bowes, Runbeck, and Bell & Howell. (See *Appendix III*, "Automated Processes Vendors List.") As a consequence, a wide range of algorithms and standards, each particular to that machine's manufacturer, are used to verify signatures. In addition, counties have discretion in managing the settings and implementing manufacturers' guidelines.

Although California law has detailed statutory requirements for the statewide voter registration database[49] and ballot tally software program source code,[50] there are no statewide standards for automatic signature verification. In addition, automatic signature verification software often has adjustable thresholds that allow for variation according to the registrar's discretion. "We can adjust the tolerance," stated a registrar from a small county, "if we see that it's not calibrated right…to balance speed and accuracy." Such practices allow for even more variance in the name of convenience and at the expense of uniformity, even when two counties share identical voting machines. Establishing requirements and guidelines in California law for the thresholds and algorithms that need to be used for automated signature matching would make the process more uniform across counties.

Registrars also indicated that the methods by which signatures are collected can adversely affect downstream processes. For example, several registrars complained that the relatively poor quality of signatures from the DMV can cause voters' corresponding ballots to be challenged more often and can make it more difficult for the registrar to match signatures. This was for two reasons: (1) the electronic signature pads provided by the DMV tend to produce low-quality images that do not accurately capture a voter's signature, and (2) a voter may not put much care in their DMV signature because they do not realize it will be used later to verify their VBM ballots. These factors, one registrar noted, can cause signatures to sometimes look like "scribble." Such factors could also inhibit a county's ability to adopt more efficient methods of automation in the first place. Another registrar noted that the existence of a line on the ballot return ID envelope as part of the signature space creates "noise" that is difficult for algorithms to filter out, preventing their county from using automated processes for signature matching. Such problems could be solved by introducing more standards and uniformity in how signatures are collected, such as standardizing the signature space or introducing minimum resolution requirements for electronic signatures. Improving the resolution of DMV signature pads, together with improved synchronization of automated VBM matching algorithms, may also benefit signature verification outcomes.

49 Cal. Sec. of State, *Statewide Voter Registration Database*, sos.ca.gov/administration/regulations/current-regulations/elections/statewide-voter-registration-database.

50 Cal Sec. of State, *Escrow of Ballot Tally Software Program Source Codes*, https://www.sos.ca.gov/administration/regulations/current-regulations/elections/escrow-ballot-tally-software-program-source-codes/.

In sum, automation can serve several functions in the VBM verification process. While some counties do not use automated ballot processing at all, and others use it for signature verification, the majority use automated processes solely to sort and process ballot return ID envelope signatures for later human verification. Whether a county is likely to rely on automation seems to depend on its population and the Registrar's familiarity and comfort with the technology.

E. Training and Staffing

Staff training processes are among the primary sources of variety in counties' implementation of the EVCA. We found considerable variety not only in the protocols by which county staff were instructed to verify signatures, but also in the depth and formality of the training process itself. There is also a wide degree of variation in the sheer number of people involved in election administration across the state—ranging from two or three permanent staff in some smaller counties, to seventy or more employees working on any given election cycle in some larger counties.

As with verification methods, counties also demonstrate considerable variation in training processes. In general, we found that while all counties ground their training in institutional practices cultivated over time, those with over 750,000 people tend to have formal training processes, while counties under 100,000 are more likely to use informal "on the job" training. There is variation, however, with some smaller counties of less than 50,000 people sending their verifiers to training sponsored by the California Association of County Election Officials (CACEO), while some larger counties, with populations of a million, rely on informal training processes. Additionally, we found considerable variety in the degree of supervision and formality embedded in "on the job" training. For example, one county that employs an "on the job" training model follows a strict protocol, whereby new staff first shadow experienced personnel and then must demonstrate competence by correctly identifying a batch of mismatched signatures before being authorized to work independently. By contrast, other counties using the "on the job" training model employ a much less formal "if you have any questions, just ask" policy.

Many counties conduct training in an ad hoc fashion based on internal resources they have developed. Some have developed graphology training materials that use examples of actual signatures to teach new staff how to observe similarities and differences, while other counties train staff according to more general principles. Some counties rely on materials their senior staff have received at a statewide or national training. Many others develop their own training materials, often integrating guidelines from professional trainings by outside organizations. These internal materials can vary widely, ranging from a short PowerPoint deck citing general best practices to lengthy, county-specific, step-by-step manuals describing each stage of the verification process. Many training materials quote or paraphrase California law, emphasizing that signatures should be "construed liberally in favor of the voter."[51] The structure and tone of the materials is consistent with this principle—despite the variety in approach.

51 Some emphasized this point even further, stating, for example, that "only signatures which are obviously different than the signature on file should be challenged" (quote taken from a county registrar in a large diverse county).

The CACEO plays an important role in providing training for many counties, large and small. About a quarter of the counties we surveyed reported that they rely on CACEO training at various points in the election cycle. That said, the smaller the county, the less likely they are to rely on formal training processes.

In some counties, local law enforcement agencies help train county registrar election staff on graphology for signature verification. Two counties also mentioned working with a forensics expert but did not specify the expert's affiliation.

Staffing plans vary widely. Staffing arrangements reflect the tremendous diversity of scale among California counties, with the smaller counties handling all of their ballots in-house among two or three permanent staff, and the larger counties employing large teams and drawing heavily on temporary employees to cover high-volume election cycles. Counties that employ temporary staff utilize varying quality controls to ensure staff are trained and supervised appropriately, and those registrars say they are satisfied with the role and work product of their temporary staff. Many such counties rely on temporary staff strategically to cover routine administrative tasks to enable full-time staff to focus primarily on verification work; temporary staff may also conduct only the initial phase of sorting, which is then verified by permanent staff. No county reported allowing temporary staff to make final decisions regarding ballot challenges for signature mismatch.

California law mandates that the "processing of vote-by-mail ballot return envelopes, and the processing and counting of vote-by-mail ballots," must be "open to the public."

The diversity of training procedures and staffing structures reflects—and indeed, reinforces—the variation we observed across counties at every stage of the signature verification process. While some flexibility is a valuable characteristic in county systems, staff training may form a baseline set of standards. It is worth noting that, at the county level, nobody is complaining: it seems that most counties have found systems that work for them, whether it is a single clerk in a sparsely populated rural county who has been reviewing the same signatures for years and feels the process is simply "common sense," or a registrar in a large county training seventy staff through an elaborate process developed and updated over the years. That said, the one existing commonality across most counties is the importance of CACEO training materials and criteria. CACEO materials and guidelines lend some continuity to county practices.

F. Election Observers

Alongside election officials, members of the public also play a role in monitoring the faithful execution of signature verification processes by serving as election observers. California law mandates that the "processing of vote-by-mail ballot return envelopes, and the processing and counting of vote-by-mail ballots," must be "open to the public."[52] This permits members of the public—including representatives of political parties, political action committees, and candidates—to observe election procedures, including signature verification processes. California law requires that public observers be allowed "sufficiently close access" to verify whether county officials are following established procedures for verifying whether ballot return ID envelope signatures match those in a voter's registration file.[53] The law also gives county officials discretion to determine what constitutes "sufficiently close access"[54] and allows them to limit the number of observers.[55]

Observers challenging a ballot return ID envelope signature must establish "extraordinary proof of the validity of the challenge at the time the challenge is made."[56] This high burden of proof is established in recognition of the fact that, unlike in a polling place, the voter is not present to rebut the challenge during vote-by-mail processing.[57] Knowingly challenging a person's right to vote without sufficient evidence "solely for the purpose of preventing voters from voting or to delay the process of voting" is a criminal offense.[58]

In general, we find that the role of observers in signature verification varies by county and seems to depend on each county registrar's personal directives, rather than state-wide guidelines. Counties with more expansive roles for observers in signature verification have, in some cases, encountered seemingly partisan signature verification challenges. All registrars, however, claim that they have policies in place that help them manage observers' rights to access when it comes to verifying VBM ballot signatures.

When assessing the role of observers in signature verification, counties fall into one of three categories. Some counties allow extensive observer participation—in these counties, observers can issue challenges to signatures that trigger a second round of verification by election staffers (e.g., Riverside, Santa Clara, San Luis, and Orange). At least one medium-sized county does not allow observers to view the signature verification segment of election processing at all, citing privacy concerns related to the voter's signature to explain this limitation. Between expansive and zero observer access to signature verification, a third group of counties allow observers to challenge the signature verification process, as it is being conducted by staffers, but not to challenge individual signatures themselves (e.g., San Mateo, Santa Cruz, Lassen, and Shasta).

While some county officials were open to observer challenges to individual signature matching determination, they had not yet experienced any such challenges (e.g., Del Norte, Imperial, and Plumas). In this vein, a small, rural county official stated that, if observers were to issue challenges, the

---

52 California Elections Code § 15104(a).

53 California Elections Code § 15104(a); *see also* California Elections Code § 2194 (providing that public observers must be allowed to view voter signatures "for the purpose of determining whether the signature matches a signature on an affidavit of registration.").

54 California Secretary of State, Elections Division, Election Observation Rights & Responsibilities, May 11, 2018. https://elections.cdn.sos.ca.gov/ccrov/pdf/2018/may/18116jl.pdf.

55 California Elections Code § 15104.

56 California Elections Code § 15106.

57 Ibid.

58 California Elections Code § 18543.

county would "take each instance into individual consideration" when dealing with challenges. This reinforces a general observation that the observers' role in signature verification is not only varied across counties, but also determined by personal directives from county election administration leadership.

Certain counties that allow observers to challenge individual signatures struggled with partisan or, seemingly, race/ethnicity-based challenges. For example, a large urban county election official noted that in the November 2018 election, some observers appeared to challenge ballots based on factors such as surname and party affiliation. While it is difficult to avoid observer challenges based on seemingly partisan, racial or ethnic discrimination, the tendency for observers to do so often comes to light early in the signature verification process and is managed by county officials. After all, registrars and election workers are aware of partisan incentives and, upon higher-level review of the signature, discriminatory, non-substantive challenges ordinarily are recognized and rejected.

Many counties design their observer guidelines to minimize disruption to election processing. While these guidelines or rules are not always sufficient to prevent discriminatory challenges to signatures, they evince an admirable awareness that signature verification is open to partisan, racial, or ethnic bias. This awareness hopefully ensures discriminatory challenges are dismissed at higher levels of review.

In sum, our interviews indicate that many counties do not allow outside observers "sufficiently close" access to inspect individual voter signatures during the signature verification process. Some of these counties appear to be doing so out of concerns about privacy, observer bias and the potential for politically or racially discriminatory challenges to lawfully cast ballots.

G. Impact of Specific Processes and Practices on Rejection Rates

We can attempt to assess the impact of some of the specific processes and practices discussed above—such as use of algorithmic matching automation, entirely vote-by-mail elections, and levels of signature review—by comparing counties with and without these different procedures, and by looking at counties before and after they implemented such practices. By doing so, we can assess the impact of such practices on the overall VBM rejection rate and the signature mismatch share of rejections. *Table 1* lists the summary statistics for comparison.

TABLE 1: VBM Rejection Rates and Share of Rejections For Signature Mismatch						
	Overall VBM Rejection Rate			**Signature Mismatch Percentage**		
	Mean	**Median**	**Standard Deviation**	**Mean**	**Median**	**Standard Deviation**
2004	0.036	0.016	0.05	—	—	—
2006	0.061	0.046	0.085	0.076	0.065	0.062
2008	0.022	0.009	0.044	0.258	0.24	0.225
2010	0.015	0.011	0.014	0.251	0.229	0.212
2012	0.013	0.01	0.011	0.291	0.272	0.189
2014	0.014	0.012	0.01	0.225	0.164	0.181
2016	0.007	0.006	0.005	0.417	0.377	0.222
2018	0.027	0.015	0.031	0.205	0.127	0.188
Total	**0.023**	**0.011**	**0.041**	**0.257**	**0.211**	**0.213**

Each reform will be discussed (see *Figures 6 and 7*), but note that, initially, automation shows no statistically significant effect.[59] Yet, automation does increase rejections by 1.7 points when the first round does not include human review of every ballot—a 74% increase for the average county rejection rate. (In California, three counties have automated processes that do not include human review of every ballot.) Entirely VBM elections notably show a decline in VBM rejection rates—a 52% reduction for the average rate. Each additional level of review, however, slightly decreases the rate, with a slight caveat discussed below. Finally, no reform had any statistically significant effect on the rate of rejections due to mismatched signatures, which can be seen with every coefficient's confidence intervals overlapping with zero.

59 In other words, the confidence intervals overlap with zero and the reform is not statistically different from a zero effect on the rate.

FIGURES 6 AND 7:

Plotting the models' coefficients. The coefficients for no review automation and entirely VBM elections are statistically significant for respectively increasing and decreasing the rejection rate. These coefficients were all modeled separately, but are included on one plot for ease of interpretation and comparison.

FIGURE 6: Effect of Different Reforms on VBM Rejection Rate

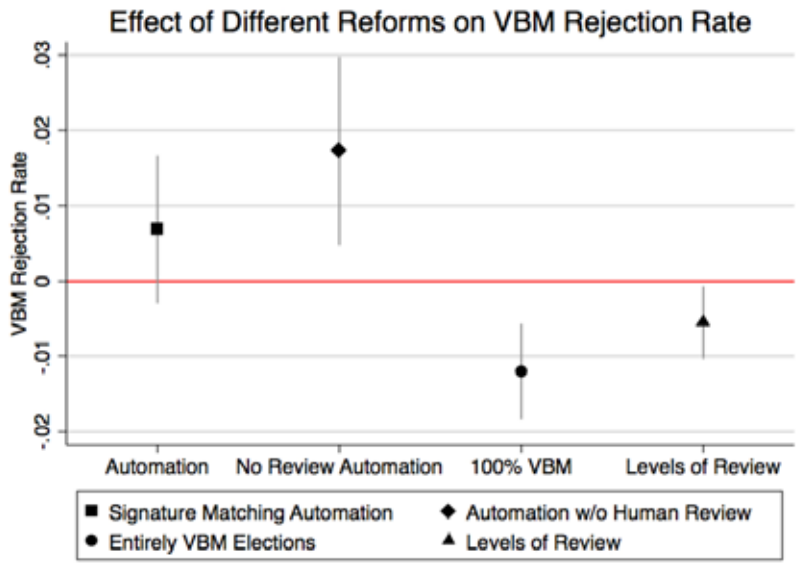
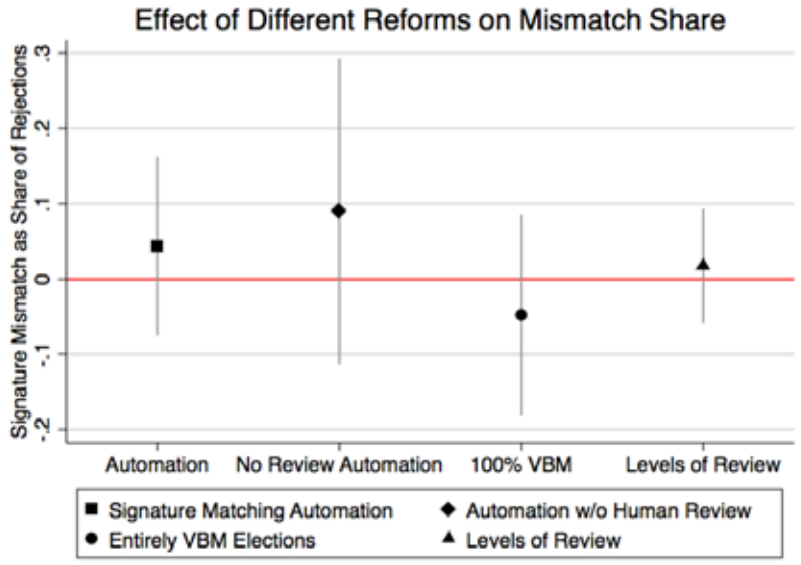


FIGURE 7: Effect of Different Reforms on Mismatch Share



I. Automation

Finding: Automated signature matching that includes human review has no significant effect on signature rejection or mismatch rates.

Automated signature matching systems have no effect on the rejection rate or share of rejections for signature mismatch, unless such automation did not include any human review. Without human review, automation increases the rejection rate by 1.7 points—a 74% increase for the average rejection rate and 41% of the standard deviation.

Our models are greatly bolstered by several counties adopting automation during the years of our data. Seven counties switched from manual first-round review to an automated signature matching system during the years of the dataset—Marin County beginning in 2005, Los Angeles in 2007, Merced in 2011, Monterey in 2018, San Diego in 2010 with an updated system in 2018, Sonoma in 2009, and Ventura in 2012.[60] Monterey, San Diego, Sonoma, and Ventura stressed that at this time automation is followed with human review for every ballot. Five additional counties are switching or considering a switch for 2020—El Dorado, Sacramento, San Luis Obispo, Imperial, and San Francisco. Of course, 2020 is outside the years of our data.

Interestingly, automation had no statistically significant effect on the share of rejections attributed to signature mismatch or the VBM rejection rate, yet did increase that rejection rate, as mentioned above, if we only coded for automation without any additional human review (i.e. narrowing the results to three counties). Thus, while counties may save on personnel costs by adopting complete automation without human review, they should expect an increase in rejections, but would see no effect on rejections if human eyes confirm every automated result.

One reason automation as a whole had no statistically significant effect can be seen in *Figures 8* and *9*. Note in the plots that the seven counties that adopted automation had decreasing rejection rates and increasing mismatch shares even prior to the introduction of automation, without any stark change after the reform. In other words, automation as a whole (of all forms, not just those without human review) had no effect on the rejection rate or the mismatch share before and after the reform.

60 Marin upgraded its verification process in 2014 with a new mail sorter containing automated signature verification capabilities. Unlike the previous scanner, which compared ballot signatures to the original registration signature on file, the new sorter groups ballots into precincts.

Figures 8 and *9*: Counties that adopted automation already had decreasing rejection rates and rising mismatch shares both before and after the policy implementation.

FIGURE 8: VBM Rejection Rate Before and After Adopting Matching Automation

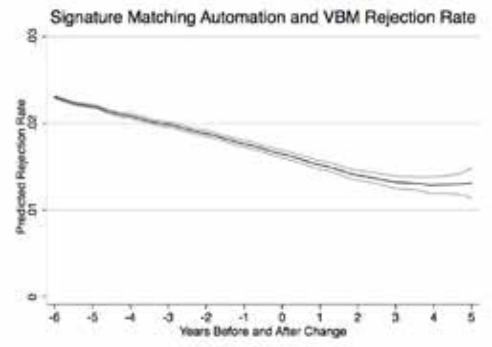
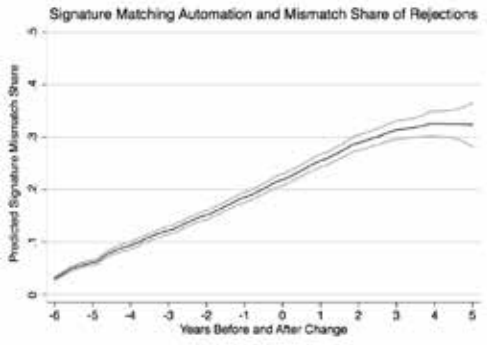


FIGURE 9: VBM Mismatch Share Before and After Adopting Matching Automation



II. Complete VBM

Finding: Entirely VBM elections show a slight decrease in the number of rejected ballots but not due to signature mismatch.

In comparison to partial VBM elections, entirely VBM elections resulted in a slight decrease in the percentage of rejected VBM ballots—down 1.2 percentage points, a 52% reduction for the average rejection rate and 29% of the standard deviation—but had no discernible impact on rejections due to signature mismatch issues, as shown in the coefficient plots above. Perhaps this counterintuitive result is rooted in more leniency, more consistency, or more communication after converting to entirely vote-by-mail.

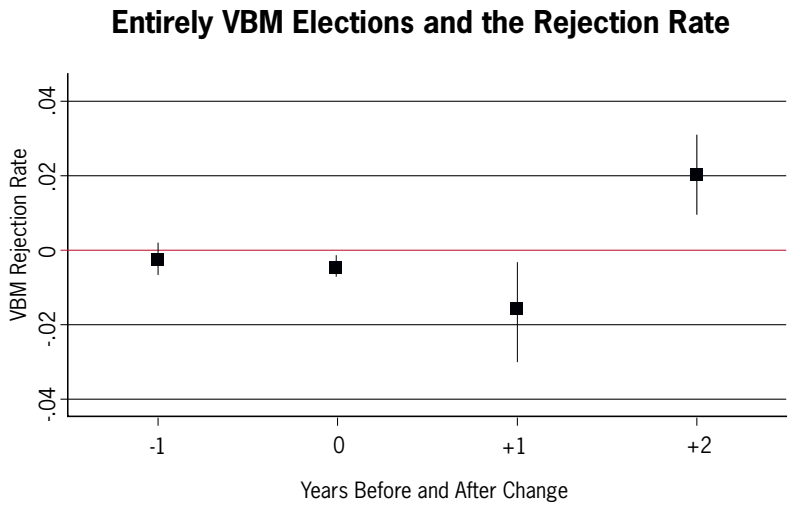
Eight counties—either early adopters of the Voter's Choice Act or rural counties adopting VBM due to low voter density—used fully VBM elections during the years of our data: Alpine, Madera, Napa, Nevada, Plumas, Sacramento, San Mateo, and Sierra.[61] These counties provide before and after variation that greatly strengthens the confidence of our results.

To make sure this statistically significant effect for the rejection rate does not suffer from the same issues for counties with automation above—i.e., counties that adopt entirely VBM elections are simply less likely to reject a VBM ballot or their rate is decreasing already—we plot the rejection rate before the change is implemented, the first year of its introduction, and two years later. Before the change, in "year -1," the effect is not statistically different from zero; that is the expected effect before a change has been implemented. The rejection rate slightly decreases in year 0, the first entirely VBM election, and the next year drops 1.6 points—a 70% reduction on the mean rate and 39% reduction of the standard deviation—suggesting our results are robust. The coefficient for two years after the change—a 2-point increase—should be approached with caution as only one county, Sierra, both changed during the years of our dataset *and* did it early enough to have two years of data post-change. In other words, it only reflects Sierra County's experiences implementing entirely VBM elections.[62]

61 Because Alpine County has been utilizing fully postal elections since 1989, it provides no variation for the period of our data.

62 And given Sierra County's rural nature, rejected VBMs number in the tens out of the roughly 2,000 returned VBM ballots.

FIGURE 10: VBM Rejection Rate Before and After Adopting Entirely VBM Elections
The rejection rate decreases substantially in the second VBM election (year +1).



III. Levels of Review

Finding: Additional levels of review enhance ballot cure rates.

As the level of review increases by one tier, we observe the rejection rate decrease by about half of a percentage—a 24% decrease on the mean rate and a 13% decrease of the standard deviation—even after controlling for the total number of VBM ballots returned. This variable, unlike the others, lacks any variation within counties. When we do not observe intra-county variation, any changes in rejection rates or signature mismatches from year to year can be ascribed as equally to county fixed effects (i.e., distinctions between and across counties) rather than changes in procedure (distinctions within counties). In other words, the controls for county and coefficients for procedure blend together because no county changed procedure between 2004 and 2018. For this result, it could be just as true that counties with additional levels of review are simply more likely to remedy a challenged ballot.

IV. Cure Methods

Finding: Follow-up cure letters are the single most effective tool for improving cure rates, far greater than using other forms of notification like email and phone.

We received 2018 challenge and remedy numbers from twelve counties: Amador, Contra Costa, Humboldt, Kern, Los Angeles, Marin, Napa, Sacramento, San Francisco, Santa Clara, Santa Cruz, and Sonoma, comprising 45% of the state population and ranging from the 21st percentile of county size to the 100th percentile. Counties did not collect this data prior to the EVCA, limiting our observations solely to the 2018 election cycle.

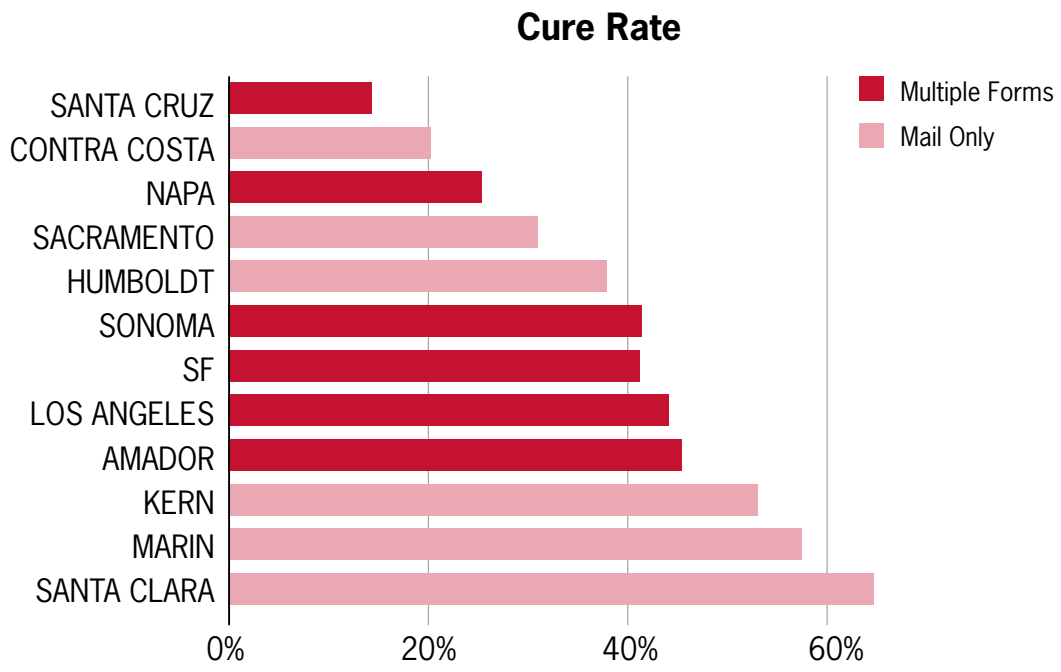
Six of the twelve counties practice multiple forms of remedy notification (email, mail, phone), while the other six only use USPS mail. Of the mail-only counties, Marin and Santa Clara also follow up a second time by letter with voters who do not respond to the first notification. Based on the summary statistics alone, mail-only notification is more effective than using multiple forms of notification, and is augmented by sending a second follow-up letter. Counties that used multiple forms had a mean remedy rate of 35% versus a 44% mean for mail-only counties. If we exclude the follow-up-letter counties, the mail-only counties are nearly even with multiple-form counties, 36% remedy versus 35%.

That is, Marin and Santa Clara have vastly higher remedy rates than the others, bringing up the mail-only average. They achieved a 61% mean remedy rate versus 35% for the other counties, a substantial 26-point difference. A regression model, with a very small sample size and only one year of observations, but controlling for the number of VBMs, illustrated that follow-up letters increase remedy rates by 26 points—identical to the summary statistics but with the additional control for the number of VBMs. Additionally, Santa Clara and Marin both include pre-paid postage, yet the former shows a 65% remedy rate while the latter is 57%. Our data did not reveal an explanation for the disparity in the remedy rates.

It may be that multiple forms of notification are hampered by the lack of phone and email data on many voter registrations, but follow-up letters could be the single greatest contributor to curing defective ballots. Voters are likely primed by the official nature of a government letter and the added urgency of a second one within a week or two of the first. To further bolster remedy rates, the Secretary of State could assist counties in matching phone/email data from other data sources to voter registrations and/or making phone/email a required part of voter registration with an opt-out provision rather than an opt-in.

FIGURE 11: Remedy Rate by Notification Form

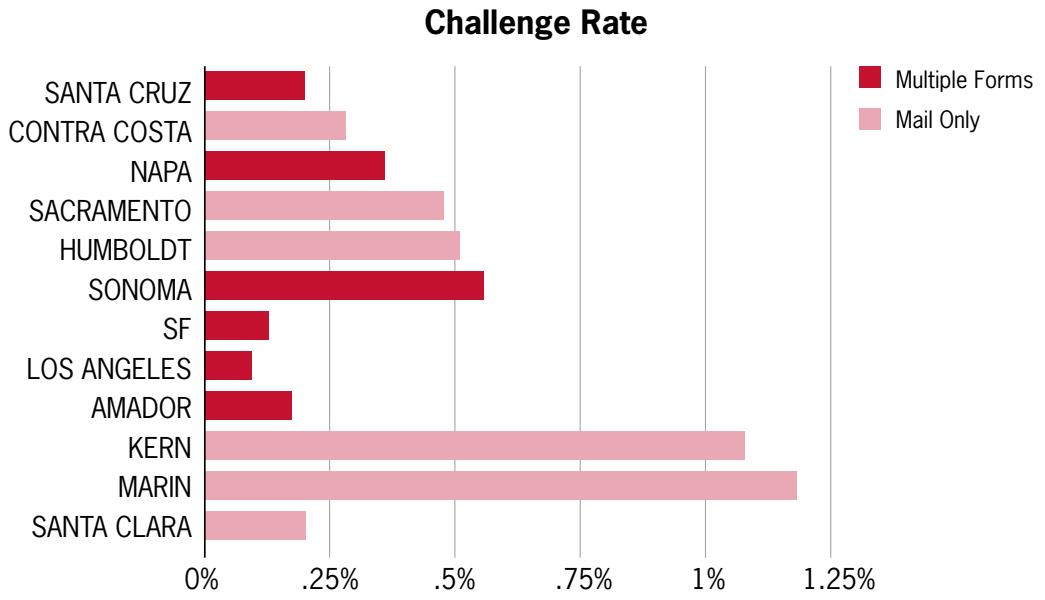
Mail-only counties had some of the highest cure rates, particularly Santa Clara and Marin which send voters follow-up letters.



Interestingly, there is a subtle correlation between the signature challenge rate and remedy rate. Counties with lower cure rates also had lower challenge rates. This might indicate that ballot challenges in counties with lower challenge rates are more likely to identify true signature mismatches (i.e., the wrong voter) that are not capable of cure, as opposed to, for example, a signature of the correct voter whose signature has simply changed over time and is, therefore, a good candidate for remedy. Nonetheless, it is illuminating to examine the cure rate of different remedy methods.

FIGURE 12: Challenge Rate

In general, counties with lower cure rates also had lower challenge rates.



Notice and Remedy

Under the Every Vote Counts Act, California county election officials are required to notify a voter of a signature mismatch, and allow the voter to remedy the issue.[63] The court in the *La Follette* case found that the failure to require such notice violated the due process rights guaranteed by both the California and United States Constitutions.[64] Unlike the substantive due process rights at the heart of many important Supreme Court cases, such as *Obergefell v. Hodges* or *Lawrence v. Texas*, procedural due process requires notice and a right to be heard when individuals' rights are at risk of deprivation.[65] In *La Follette*, the judge concluded that, because voting is a fundamental right, California could not avoid providing every voter an opportunity to remedy a signature mismatch.[66]

63 *Every Vote Counts Act*, California SB 759, 2018, https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180SB759.

64 *La Follette v. Padilla*, 2018 WL 3953766 (2018).

65 For a discussion of how courts determine what type of hearing is owed, *see Mathews v. Eldridge*, 424 U.S. 319, 334-35 (1976).

66 2018 WL 3953766 at *2.

According to the Secretary of State and the EVCA's author, Senator Mike McGuire (District 2), the central purpose of the new law was granting voters the right to correct a mismatch.[67] It introduced two requirements for election officials. First, officials must notify voters whose signatures are challenged by sending them instructions on how to verify their signatures.[68] Second, they must count the votes of all voters who return the verification signature by mail, email, fax, or in person.[69] Prior to the enactment of the law, election officials were not required to provide notice or give an opportunity to remedy the mismatch, though some counties had set up these systems voluntarily before the law was enacted.

Our interviews indicated widespread compliance with the notice requirements of the law. All the counties interviewed now provide notice by mail for every signature mismatch they identify, and most supplement this notice through phone and email contact when they have the voter's contact information. We identified several outlier practices in counties investing additional resources into notifying voters: two counties that use social media to locate hard-to-contact voters, and one county planning an advertising campaign to educate voters about the new law.

Although all counties interviewed provide voters with an opportunity to remedy the mismatch, the means available to voters to do so varied. Most counties allow voters to remedy by mail, fax, email, or in person. Some counties, however, restrict the remedy options to in person and by mail. This discrepancy may be of limited practical significance, however, as we found no correspondence between the range of remedy options available and the remedy rate.

While the Every Vote Counts Act provides specific instructions for the content of the notice to voters, it does not specify whether election officials should provide this notice by mail, phone, or other means.[70] In all counties interviewed, however, the election officials interpreted the law to require at least notice by mail. In the majority of counties, election officials supplement this mail notice by emailing and calling voters who provided their email and phone number with their ballot. A minority of counties only notify by mail, and one county interpreted the new law to require ending its practice of notification by phone.

All counties interviewed allow voters to remedy a signature mismatch by mail, and all but one allow voters to do so in person as well. Although the law requires counties provide voters an option to remedy by email,[71] nine in our sample do not do so.

A. The Impact of the Every Vote Counts Act on County Practices

The impact of the Every Vote Counts Act varied widely across counties. While some counties expanded or formalized their notification efforts in response to the law, others retained previous policies or even curtailed notification practices. Merced, a mid-sized county, and Kern, a large county, are two examples of counties that began notification efforts because of the EVCA. Before the law was enacted, Merced County did not send letters informing voters of a signature mismatch. The Registrar called voters who provided a phone number, but those who did not provide their number received no notification. Now, the county sends a letter in response to every signature mismatch, and also calls and emails voters who provide that information. In Kern County, the Assistant Registrar praised the EVCA for its impact on

67 "California Senate Approves Every Vote Counts Act to Give Voters the Opportunity to Correct Mismatched Mail Ballots." Press Release. August 28, 2018.

68 SB 759 § 2(d).

69 SB 759 § 2(d)(3)(A).

70 SB 759 § 2(d)(2).

71 SB 759 § 2(d)(3)(A).

notification efforts. Before, the county would notify voters with a missing signature, but generally not those with a mismatch. Now, the county sends a mail notification for all mismatched signatures. San Luis Obispo County expanded the remedy options available to voters in response to the law. While voters previously were allowed to remedy a signature mismatch in person, they now have the additional options of curing by mail, email, or fax. Now, mail is the most popular curing method among San Luis Obispo voters.

Other counties responded to the EVCA by formalizing their notification efforts. In Los Angeles, California's largest county, the Registrar began sending out formal notification letters following a mismatch, a change from the previous practice of sending a generic voter registration update form. Los Angeles County also responded to the law by tracking mismatch and remedy rates. In Del Norte, a small county, the EVCA provided additional structure, resulting in more organized systems for notification and remedy. In Calaveras, another small county, the registrar gives more time for notification and remedy since the law passed.

Two of the surveyed counties responded to the EVCA by *curtailing* their outreach efforts. In El Dorado and Modoc Counties, the registrars responded to the law by replacing phone notification with notification only by mail. Interviews with both of these small counties revealed that prior to the law, election staff had conducted more personalized efforts at contacting voters, either visiting them in person or finding them in the phonebook. Now that the law requires written notice, these counties shifted their practice to mailing notifications instead of tracking down voters through other means.

B. Notice

The *La Follette* court held that the U.S. Constitution's procedural due process protections require that a voter must be notified when the signature on their mail-in ballot does not match the signature that the county has on file. To comply with the ruling, California passed the Every Vote Counts Act, which mandates that notice of a mismatch be provided "a minimum of eight days prior to the certification of the election."[72] The law also details the precise language of the notice to be delivered.[73] Notice must also be made available in all languages that the Voting Rights Act requires for ballots.[74]

Overall, the interviews indicated widespread compliance with the requirement to mail notice of a signature mismatch. The primary distinction that emerged was that some counties notify only by mail, rather than following the majority practice of supplementing mail notice with contact by phone and email. The counties that follow a mail-only policy tend to be larger counties: Orange County, Riverside County, Contra Costa County, and Kern County. This pattern has several notable exceptions, however. Los Angeles County, Sacramento County, and San Mateo County are large, but they follow the more expansive practice of notifying voters in multiple ways. Some mid-sized counties also restrict their notification to mail-only: San Luis Obispo County, El Dorado County, and Humboldt County.

72 Cal. Elec. Code § 3019(d)(1).

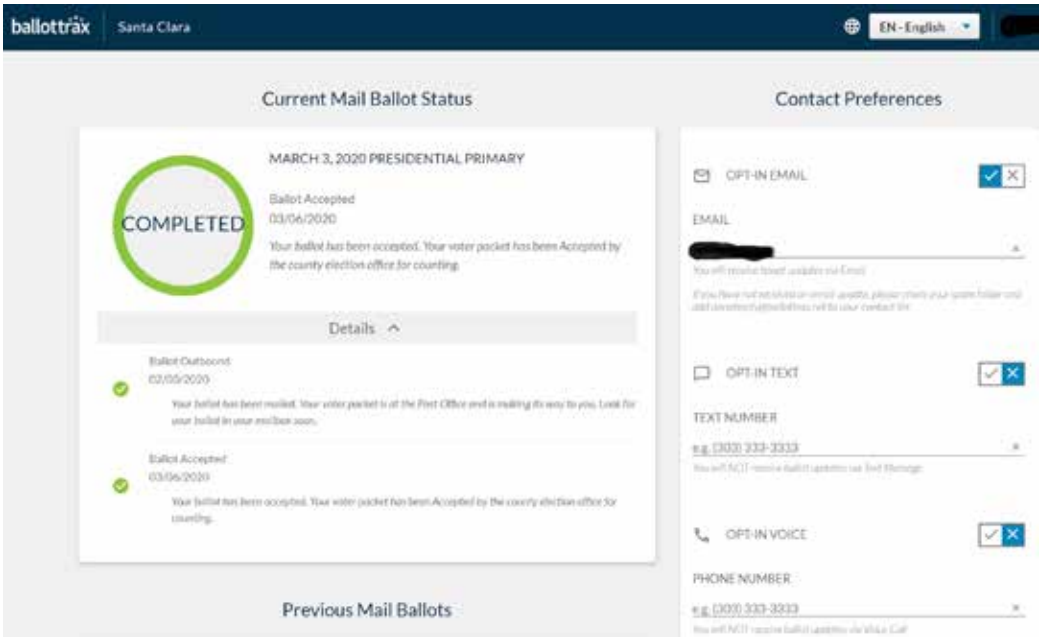
73 Cal. Elec. Code § 3019(d)(2).

74 Cal. Elec. Code § 3019(d)(3).

Several counties emerged as outliers in their more extensive efforts to notify voters of a signature mismatch. Santa Clara County follows up on initial mail notification with a reminder letter to voters who have not cured. In Shasta and Lassen Counties, the registrars use Facebook to locate and notify some voters who do not respond to an initial letter. Shasta County also adopted a pilot program allowing voters to opt in to text message notifications about their ballot status. In 2020 Kern County had planned a television advertising campaign in English and Spanish to educate voters about the importance of signature matching and their rights under the EVCA, though this plan was later cancelled.

One emerging practice in voter notification is online portals that allow voters to monitor the status of their ballot as it goes through the counting process. The California Secretary of State offers a portal, "Where's My Ballot?" that enables a voter to register their contact information to receive updates from their own county about the status of their ballot.[75] Currently 25 counties have adopted the BallotTrax tool, which the Secretary of State sponsors at no cost.

FIGURE 13: Image of BallotTrax Portal for Santa Clara County
BallotTrax ballot tracker for a voter in Santa Clara County,
https://california.ballottrax.net/voter/dashboard



The portal asks the voter to opt in with email, SMS, or voice notifications about the status of their ballot. Some voters, however, have concerns about privacy and may be reluctant to share contact information. Interviews with Calaveras, Del Norte, and Shasta counties further revealed that some voters choose not to provide this information because it can be shared with campaigns, which they prefer not to do. Thus, there is an underlying tension between a voter's interest in preserving privacy and the ability of counties to contact a voter about the status of their ballot.

75 See California Secretary of State, https://voterstatus.sos.ca.gov/. *See also,* "Where's my Ballot?" Press Release, Feb. 4, 2020, AP20:013, https://www.sos.ca.gov/administration/news-releases-and-advisories/2020-news-releases-and-advisories/ap20013-wheres-my-ballot-new-tool-launched-help-voters-track-status-their-vote-mail-ballots/.

C. Remedy

The Every Vote Counts Act includes specifications for the "signature verification statement" that voters whose ballots have been challenged must complete for their vote to be counted.[76] Under penalty of perjury, a voter provides a new signature and declares he or she is a resident of the relevant county, and is the person to whom the challenge notice was addressed.[77]

The law does not enumerate every means by which a county must accept this signature verification form, but it does require that they at least accept it by fax or email, as well as by mail or in-person.[78] While all counties interviewed accept the forms by mail or in person, fax and email are not yet available as a remedy option in every county. In San Benito County, the registrar requires a "wet signature" to remedy a signature mismatch, meaning that voters must provide a physical signature, hand-written in pen. No digital copies are accepted. In San Joaquin County, voters also cannot remedy via email. Several other counties did not specify a policy against curing online, but they only mentioned in-person and mail as a remedy option: El Dorado, Kern, Marin, Madera (mail-only), and Fresno counties.

A potential implication of allowing remedy only by mail is that voters may not have time to remedy a signature mismatch before the election results are certified. In Sonoma, Amador, and Shasta Counties, election officials begin using phone calls and emails more as the deadline for certification approaches. This underscores the timing advantages of these forms of contact. In counties where voters can only remedy by mail, voters informed later in the process may be less likely to have their votes counted due to delay.

Cure rates (the percentage of voters who remedy a signature mismatch by submitting a signature verification) vary widely across counties. Although our quantitative analysis shows a link between a second follow-up letter and successful cure rates, our qualitative interviews complicate that link. For example, Madera County only allows voters to remedy by mail, and the county does no follow-up after sending the initial letter, yet the county reports a remedy rate of approximately 80%. By comparison, Napa County, which notifies voters by mail, phone, and email and allows voters to remedy using any of the methods, reports a remedy rate of roughly 50%.

One discrepancy that emerged among counties was the comparator used for curing a signature mismatch. Under the new law, election officials have two options for comparison once a voter sends in a signature verification form. They can either compare the verification signature to the signature used to register, or to any form issued by an election official with the voter's signature.[79] Our interviews did not indicate a standard or majority practice for comparison. In Riverside County, a voter's signature verification form still must match the voter registration card, meaning that voters whose signatures have changed since they registered will not remedy the mismatch even if they send in a form to verify their identity. Los Angeles County, by contrast, compares the signature on the verification form to the signature on the ballot return ID envelope. San Mateo County files the signature verification form as a "good" signature (an acceptable signature that can be used for matching in future elections) and compares it to previous signatures on file, including the original registration, the current ballot, previous ballots, vote-center check-in form, and any previous cure letters.

---

76 Cal. Elec. Code § 3019(a)(5).

77 Ibid.

78 SB 759 § 2(d)(3)(A).

79 SB 759 § 2(a)(1).

Counties also differed in the procedures voters need to follow to remedy a signature mismatch. In Marin County, the registrar encourages voters to sign their verification forms with multiple versions of their signature, allowing the county to identify whether one of these options matches the signature on file. In Amador County, election officials visit voters with limited mobility to allow them to remedy a signature mismatch, a practice made possible by the county's small size. Some counties also extend options to voters to eliminate the financial burden of curing a signature mismatch. This benefit goes beyond legal requirements: while California law requires pre-paid return postage for vote-by-mail ballots, there is no such requirement for signature verification forms.[80] In Santa Clara, Kern, Imperial, Marin, and San Mateo counties, election officials include a postage-paid business reply return envelope when they notify voters of a signature mismatch or unsigned ballot.

Our analysis of the counties' different practices indicate that counties are complying with the notice requirements of the Every Vote Counts Act, and are extending voters the opportunity to remedy mismatched signatures. The main area of concern is that voters in nine counties have limited options to remedy a signature mismatch. Expanding remedy options to allow voters to remedy by email and fax in any county would bring those counties into compliance with the new law, and would make the remedy process more accessible to voters who are unable to mail back their signature verification forms. Several outlier practices could improve notice and remedy beyond the new law's requirements. Follow-up letters, pre-paid postage, online voter portals, and voter education efforts are all possible reforms to make remedying a signature mismatch more accessible to all voters.

D. Measuring the Effect of the EVCA

Finding: The EVCA's notice and cure requirements have lowered the share of rejected VBMs for signature mismatch issues.

EVCA and online registration via the New Motor Voter Act both went into effect in all counties simultaneously with the 2018 cycle, creating obstacles when trying to isolate the effects of either law.[81] That said, about half of the counties mentioned DMV signatures from online registration as a potential source of conflict. Of the thirty-three counties interviewed, nine spoke negatively about DMV signatures and three others noted that they adjust standards for electronic pen pad signatures. Three were neutral on electronic signatures.

In trying to parse the effect of EVCA and online registration from our regression data, 2018 VBM rejection rates were 2 to 2.9 percentage points greater than rates in prior years after controlling for the number of returned VBMs—an increase of about 50% of the standard deviation. Yet, signature mismatches as a percentage of overall rejections actually decreased 20 points relative to 2016—a decrease of an entire standard deviation. In fact, 2018 mismatch figures were nearly identical to the rate in 2014, and even lower than earlier years, after controlling for the number of returned VBMs. Presidential election years had mismatch shares 2 to 7 points higher than midterm years, but 2016 was still anomalously high, despite the new online registration system not being fully in effect until 2018. The summary statistics again provide a rough estimation of these trends, along with the plots below.

---

80 California AB 216 (2018), § 1(a)(2).

81 Eric McGhee & Mindy Romero, "What to Expect from California's New Motor Voter Law," *Public Policy Institute of California*, June, 2014 (available at ppic.org/content/pubs/report/R_616EMR.pdf).

TABLE 2: VBM Rejection Rates and Share of Rejections For Signature Mismatch						
	Overall VBM Rejection Rate			Signature Mismatch Percentage		
	Mean	Median	Standard Deviation	Mean	Median	Standard Deviation
2004	0.036	0.016	0.05	—	—	—
2006	0.061	0.046	0.085	0.076	0.065	0.062
2008	0.022	0.009	0.044	0.258	0.24	0.225
2010	0.015	0.011	0.014	0.251	0.229	0.212
2012	0.013	0.01	0.011	0.291	0.272	0.189
2014	0.014	0.012	0.01	0.225	0.164	0.181
2016	0.007	0.006	0.005	0.417	0.377	0.222
2018	0.027	0.015	0.031	0.205	0.127	0.188
Total	**0.023**	**0.011**	**0.041**	**0.257**	**0.211**	**0.213**

Figures 14 and *15*: Plotting the rejection rate and mismatch share over time. Note, in *Figure 15*, the higher rejection rate in 2018 despite a downward trend across all years, and an upward trend in the rate of mismatch shares—particularly a large upswing in 2016.

FIGURE 14: Year Trends and the Returned VBM Rejection Rate

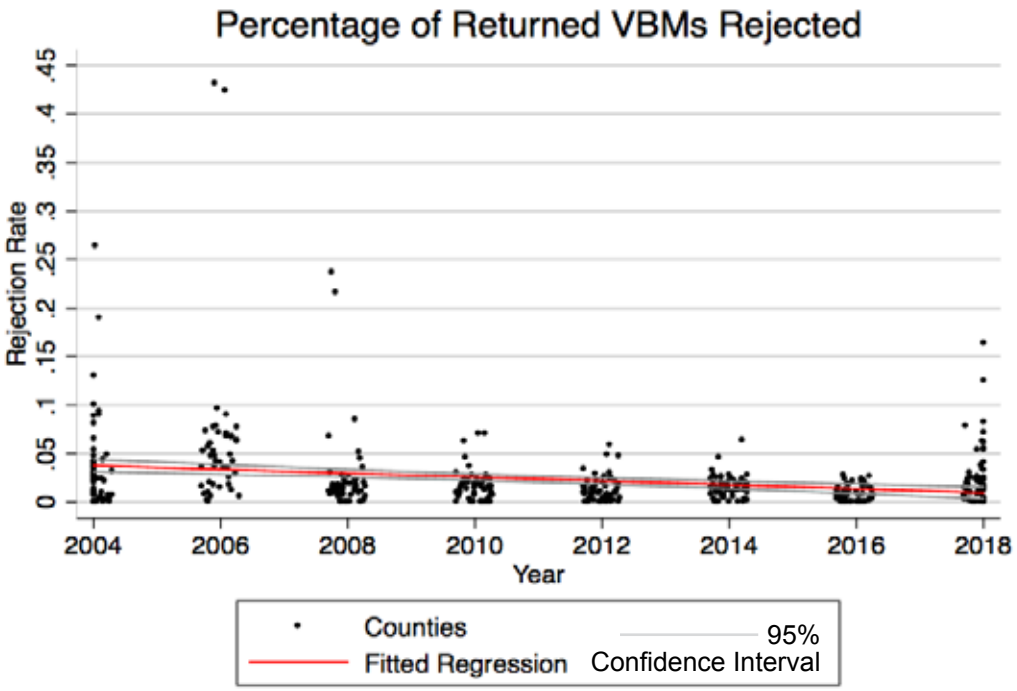
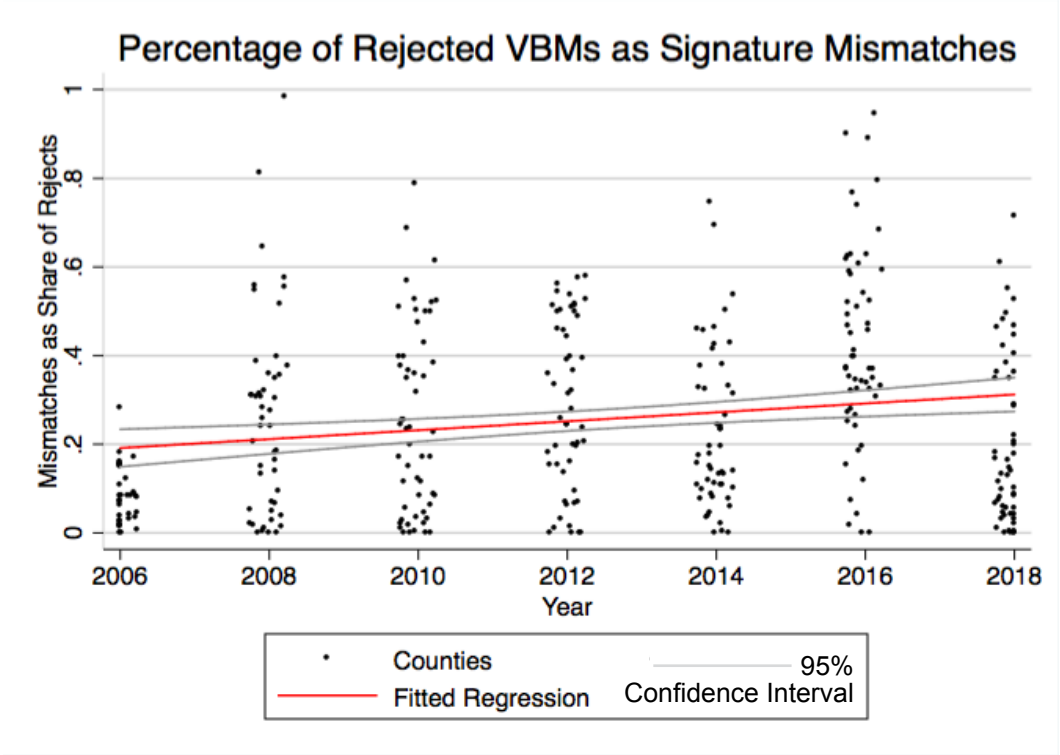


FIGURE 15: Year Trends and the Rejected VBM Mismatch Share



In other words, even after controlling for the number of returned VBMs, 2018 saw a decrease for signature mismatches as a share of rejected ballots, despite an increased reliance on DMV pen pad signatures and a 2-point increase in the rate of VBMs rejected. Mismatches as a share of all returned VBMs, not just among rejected ballots, was not statistically distinguishable from prior years, meaning potential mismatch numbers remained constant with returned VBMs while VBMs were rejected in higher numbers for other categories.[82]

Overall, one might expect 2018 to have a higher share of mismatches among reject totals, based on the new availability of online registration with the implementation of the New Motor Voter Act. That reform would suggest an impending uptick in mismatches as a share of rejects, rather than the reality of a sharp decrease from 2016. In short, the EVCA's notice and cure requirements, along with counties adjusting to the prevalence of online registration, have lowered the share of rejected VBMs for signature mismatch issues.

82 It is unclear what the dominant reason was for 2018's increase in rejections. All other reasons, as a share of VBM rejections, were statistically indistinguishable from prior years. For the average county, less than half of the rejected VBMs were coded with a cause for rejection, compared to over 80% in 2016—a roughly 40-point gap—creating complications in determining the 2018 rejection source. There is an over 65-point gap between the 2016 and 2018 medians. Even then, all specified reasons for a rejection decreased between 2016 and 2018, so no obvious suspect rises to the top. When splitting along the 2018 median to the states with more than 53% of their rejections coded for rationale, the rejection causes were still statistically indistinguishable from prior years for all reasons but deceased voters—which fell one point. Nonetheless, we know the total rejection rate did increase overall and mismatches as a share of those rejections decreased with 2018.

Recommendations

The recommendations here are grounded in research findings and organized according to the needs of voters, county registrars, and the California Secretary of State. In the case of the county registrars and the Secretary of State, our recommendations are intended as suggestions to help counties share and standardize effective practices. The recommendations conclude with suggestions for legislation and appropriations.

A. Recommendations for California Voters

Based on our interviews, we recommend California voters take the following actions to ensure their signatures are accepted and their votes counted:

1. **Make certain your voter registration information is up to date.** For example, if you have recently been married or otherwise changed your name, this information must be reflected in your voter registration.

2. **Similarly, ensure your county election office has your most current contact information, including your cell phone number and email address.** As of 2018, state law requires California election officials to notify voters if their ballot is challenged. Up-to-date contact information will make sure your local election officials can get in touch with you to correct your signature, if needed.

3. **If you are not sure what signature you used to register, contact your local election office and ask to see the signature you have on file.** This is especially a good idea if you think your signature may have changed, if you registered a long time ago, or believe that your signature may have changed.

4. **Sign, do not print, your name on the ballot return ID envelope.** Printing your name in block letters often prevents county officials from verifying your identity and counting your vote.

5. **Make sure you sign your own ballot return ID envelope.** This is required by law. Signing a ballot on behalf of absent household members may be convenient, but is illegal, even when done with their full knowledge and consent. You may authorize someone else, including a family member, to *return* a ballot for you if you are unable to do so, but never to *sign* the ballot on your behalf.

B. Recommendations for County Election Officials

Our analysis of county signature verification practices suggested multiple areas where current processes can be improved. Many of these recommendations reflect effective practices that some counties are already following. We recommend counties take the following actions to improve signature verification processes in California:

1. **Provide signature remedy letters to voters in their preferred language.** Federal legislation and California law require counties to provide specified electoral materials in languages other than English.[83] These laws stop short of requiring that signature remedy letters are provided to voters in their preferred language. We propose that counties voluntarily provide remedy letters in languages covered by federal and state requirements in their county (in addition to the English-language version). Given the small number of remedy letters dispatched in each election, we do not foresee this requirement to be prohibitively expensive, particularly when working in partnership with the Secretary of State on translation. This low-cost action can help mitigate the number of signature verification challenges on non-English-preferring voters.

2. **Include a postage-paid return envelope with the remedy letter.** While we understand this imposes an additional expense on already-stretched county budgets, the number of remedy letters is relatively small and only those voters that elect to use the pre-paid envelope to remedy will result in a USPS expense.

3. **Publish information about the signature verification criteria and verification processes that county election officials use.** Many county officials indicated that voters lack basic information regarding the importance of their signatures to the voting process. Nevertheless, most counties do not have a publicly available, written explanation of the signature verification criteria and processes they use. Posting a written explanation of this procedure on each county's website would be a helpful, low-cost first step in educating voters on this issue.

4. **Develop simple, streamlined processes that allow a voter access to their signatures on file with county election officials, and provide information about which of a voter's signature(s) county officials will use to verify the voter's ballot.** California law requires a voter's signature to match the signature(s) in their voter registration file. Yet, in many counties, there is no readily apparent mechanism for voters to determine with certainty what signature is on file. Providing such a mechanism will make it possible for voters to verify which signature to use on their ballot return ID envelope, preventing future signature verification challenges.

5. **Ask voters to provide a few samples of their signature during both the voter registration and remedy processes.** Requesting that the voter sign multiple times increases the odds of finding a match and decreases the contextual nuance that may affect someone's ballot signature on any given day and result in a mismatch. This will be especially effective when voters provide more formal signatures (e.g., the one they carefully inscribe on a credit card) and more quotidian signatures (e.g., what they use to sign a receipt at the grocery store).

83 *See* 52 U.S.C. § 10503 (Voting Rights Act Section 203); 28 C.F.R. § 55; California Elections Code §§ 12303, 14201.

6. **Adjust county processes to develop "lifetime" databases of voter signatures.** Such databases provide election officials with more points of reference, and help accurately reflect changes to a voters' signature over time. It would be most helpful to election workers if these databases displayed voter signatures in reverse chronological order. Processes like this would help mitigate the impact of signature verification processes on both young and aging voters, whose signatures are most likely to have changed. It would especially help election workers account for signature changes that are the result of a voter's medical condition, which can impact a voter's motor function.

7. **Send a second, follow-up remedy letter.** Follow-up remedy letters are more effective than multiple forms of notification, based on 2018 remedy rates. Remedy rates for the counties with follow-up letters were nearly double of those for other counties. Even when voters do not know the exact purpose of the county's repeated contact with them, they are far more likely to inquire as to the purpose after a second letter. This is especially true when outreach comes through more official-seeming forms like mail as opposed to email or phone calls.

8. **Ensure public observers have sufficient access to the signature verification process.** Public observers must be allowed "sufficiently close access" to verify whether county officials are following established procedures for verifying whether ballot return ID envelope signatures match those in a voter's registration file.[84] We encountered several counties that are not in compliance with this provision for every election. Counties should be sure to review § 15104(a) to ensure consistency across California, and the Secretary of State should regularly follow up on this issue.

9. **Explore e-notification technology that sends automatic text and/or email notifications to voters.** E-notification techniques could be bolstered by opt-out cell and email provisions during the voter registration process (i.e. requiring an affirmative step to *not* consent to email or text notification rather than opting-in). For example, if a received ballot is coded as missing the voter signature, an SMS text and email from the voter file could be automatically triggered and sent to the registered voter. This will incur an expense either by identifying a vendor or creating the tool in-house, but could more meaningfully and conveniently reach the voter with little personnel engagement.

10. **Maintain data that tracks costs and remedy rates associated with different practices and technologies.** Better data that tracks the remedy rates that result from different methods of outreach will help surface cost-effective practices and technologies that counties can then adopt according to their resources and needs.

11. **Ensure that ballot return ID envelopes explicitly state that a voter's signature will be compared to the signature/s in their registration file.** Voters do not always understand the importance of their signature. A few words on the ballot return ID envelope will remind a voter of the need to utilize their standard signature.

84 California Elections Code § 15104(a); *see also* California Elections Code § 2194 providing that public observers must be allowed to view voter signatures "for the purpose of determining whether the signature matches a signature on an affidavit of registration."

C. Recommendations for the California Secretary of State

These recommendations reflect our thinking on findings from our interviews with county election officials.

1. **Develop and publish signature verification guidelines for use by county officials.** Federal legislation requires each state to adopt "uniform and nondiscriminatory standards that define what constitutes a vote and what will be counted as a vote for each category of voting systems used in the State."[85] The California Secretary of State's office has developed and published such standards.[86] However, these standards include minimal information related to signature verification. While we recognize the importance of flexibility in county approaches, counties may benefit from more specific guidance on signature verification criteria as a way to improve verification methods. As a starting point, we recommend looking at the Colorado Secretary of State's signature verification guide, which includes specific criteria and a recommended training program for election officials working in the area.[87]

2. **Work with county election officials and registration volunteers to ensure that voters are educated on the importance of their signature and aware of notification procedures in the event of a mismatch on their ballot.**

3. **Communicate with California high school civics educators to encourage them to explain to students the important role of the signature in voting.** Many county officials worried that voters—particularly new voters and young people—do not understand the importance of their signature in the voting process. Creating curriculum resources for high school civics classes may help alleviate such concerns. Educating young voters about the importance of their signature should take place alongside the "pre-registration" of high school students to vote.

4. **Create a repository of model remedy letters in all federally and state-required languages for the use of county officials.** This could assist smaller counties, which lack translation resources, to provide remedy letters in a voter's preferred language. Officials could easily download from the database a letter in the voter's chosen language, which they could then send by mail.

5. **Standardize coding for signature rejection data, and require counties to report this information accurately to EAVS.** Our research determining the effect of EVCA was partially hampered by a significant drop in the reported reason for ballot rejections in the EAVS data, dropping from over 80% in 2016 to well under half of rejected ballots for 2018. A dearth of data on causes for ballot rejection obfuscates any direct linkage between policy reforms and results, and makes it all the more difficult for policymakers to evaluate what works between the counties.

---

85 52 U.S.C. § 21081(a)(6) (Help America Vote Act of 2002).

86 *See* California Secretary of State, "Uniform Vote Counting Standards" . (effective Oct. 24, 2016) https://www.sos.ca.gov/elections/uniform-vote-counting-standards/.

87 See Colorado Secretary of State, http://www.sos.state.co.us/.

6. **Develop and encourage counties to enhance the statement on the ballot return ID envelope to explain how voter signatures are used.** Current California law specifies several requirements for what information must be provided on the envelope voters use to return vote-by-mail ballots (See Cal. Elec. Code Sec. 3011(a)), but there is no requirement to explain how voter signatures will be verified. The ballot return ID envelope template developed by the California Secretary of State and the Center for Civic Design does include such a statement, which informs the voter that "Your signature must match the signature on your voter registration card." This suggestion should be codified into law to ensure all voters are informed of signature verification requirements.

D. Recommendations for the California Secretary of State, in partnership with the Department of Motor Vehicles[88]

Many county officials commented that low-quality signatures initially gathered by the DMV from voters during voter registration posed substantial challenges during the signature verification process. Accordingly, we recommend changes to the DMV's signature-capturing processes, including the following:

1. Introduce signage at the DMV office to raise voters' awareness of the importance of their signature in voting.
2. Add a prompt at the time of signing the electronic pad explaining how their signature may be used when voting by mail and asking voters to acknowledge their understanding of such use.
3. Train DMV personnel to advise voters briefly on the importance of the signature.
4. Work with county election officials to assess their needs for higher resolution signatures. Then, as needed, procure higher resolution signature pads that produce signature images more similar to signatures signed in pen on a ballot return ID envelope.

E. Recommendations for the California State Legislature

1. **Pass legislation implementing the following requirements for county election agencies:**

   a. **Require county election agencies to send voters with mismatched signatures a second follow-up remedy letter if the first letter is not returned within a week of mailing.** Sending multiple remedy letters leads to higher return rates than outreach via multiple forms of communication. Remedy rates for the counties with follow-up letters were nearly double those for other counties. Voters are far more likely to remedy after receipt of a second letter, and more likely to respond to more official-seeming forms such as mail than one-off email or phone calls.

88 We make these recommendations while realizing that voters register at many other state agencies beside the DMV. However, the DMV was the most frequently cited source of low-resolution signatures by county officials during our interviews.

b. **Require county election agencies to develop and publish written policies describing the signature verification criteria and verification processes used in vote-by-mail processing.** Our findings show that, while counties benefit from having some discretion and flexibility in their practices, signature verification criteria and processes vary widely across counties and are not publicly known. Many county officials we interviewed also indicated that voters lack basic information regarding the importance of their signatures to the voting process. Despite this, most counties do not have a publicly available, written explanation of the signature verification criteria and processes they use. Requiring the posting of a written explanation of this procedure on each county's website is a helpful, low-cost first step in educating voters on this issue. In the alternative, uniform state guidelines for publicizing signature verification criteria could be mandated for all counties to follow.

c. **Require county election agencies to provide remedy letters to voters in their preferred language.** Federal legislation and California law require counties to provide specified electoral materials in languages other than English (See 52 U.S.C. § 10503 (Voting Rights Act Section 203); 28 C.F.R. § 55; California Elections Code §§ 12303, 14201.) This is supposed to cover documents related to "all stages of the electoral process, from voter registration through activities related to conduction elections . . . ." (28 C.F.R. § 55). We propose the legislature make clear that they have interpreted their obligations under Section 203 to require them to provide remedy letters in all relevant languages. Given the small number of remedy letters dispatched in each election, we do not foresee this requirement to be prohibitively expensive. This low-cost action can help improve the remedy rate of signature verification challenges for non-English-preferring voters. The Secretary of State should also develop a repository, for use by county registrars, with template letters in the languages required by Federal and California law.

d. **Allow voters to 'opt-out' of including their email and phone number as publicly available information in their voter registration file.** Voters are not required to provide email or phone number contact information when they registrar, and many voters choose not to. Many county election officials we interviewed indicated that this was because voters did not want this information made available to political campaigns. This limits the methods county officials can use to inform voters when there is an issue with their signature. We recognize that political campaigns and interest groups often rely on voter registration information to mobilize voters, and play a key role in voter turnout. However, restricting the 'opt-out' function to voters' email and phone number—which are already optional—should limit the impact on voter mobilization efforts. Providing an 'opt-out' option for voters for these specific types of contact information could increase voter participation, and allow county election officials more ways to contact voters.

e. **Require counties to explain on the ballot return ID envelope how voter signatures are used.** Current California law specifies several requirements for what information must be provided on the envelope voters use to return vote-by-mail ballots (See Cal. Elec. Code Sec. 3011(a)), but there is no requirement to explain how voter signatures will be verified. The ballot return ID envelope template developed by the California Secretary of State and the Center for Civic Design *does include such a statement,* which informs the voter that "Your signature must match the signature on your voter registration card." But not all counties use this template, and this suggestion should be codified into law to ensure all voters are informed of signature verification requirements.

f. **Require counties to include a postage-paid return envelope with remedy letter.** While we understand this imposes an additional expense on already-stretched county budgets, the number of remedy letters is relatively small, and only those voters that elect to use the pre-paid envelope to remedy will result in an actual USPS expense.

2. **Pass legislation requiring the California Secretary of State to do the following:**

a. **Develop and publish more specific signature verification guidelines for use by county officials.** Federal legislation requires each state to adopt "uniform and nondiscriminatory standards that define what constitutes a vote and what will be counted as a vote for each category of voting systems used in the State." (*See* 52 U.S.C. § 21081(a)(6) (Help America Vote Act of 2002)). The California Secretary of State's office has developed and published standards. However, these standards include minimal information related to signature verification. Recognizing the value of flexibility at the county level, more specific guidance on signature verification criteria, standards and processes could enhance consistency in county practices. As a starting point, we recommend looking at the format of the Colorado Secretary of State's signature verification guide, which includes specific criteria and a recommended training program for election officials working in the area. If this recommendation is not adopted or the Secretary of State elects to distribute nonbinding guidelines, counties should be asked to publish a description of their signature verification processes and standards.

3. **Appropriate money for the following purposes:**

a. **Defray costs associated with the above recommendations.** Making additional funds available to counties can help cover the (minimal) costs associated with implementing the above recommendations.

b. **Assist the DMV and other state agencies involved in voter registration in procuring high resolution digital signature capture pads.** Many county officials we interviewed commented that low-quality signatures initially gathered by the DMV from voters during voter registration pose substantial challenges during the signature verification process. They largely blamed the DMV's signature pad technology, which did not capture voters' signatures in sufficient detail (due to the quality of the stylus and the quality of the image the screen captures) to allow county officials to verify them later.

Conclusion

The professionalism of California county election officials helps to ensure the integrity of our elections. County election officials across California are making good faith efforts to comply with the EVCA. Counties may interpret the EVCA differently, but they tend to interpret the law in terms of its spirit in favor of the voter. In providing transparency about how counties comply with the EVCA, this report helps to surface lessons and practices that may improve outcomes in the spirit of the law where "every vote counts." These findings may help educate voters on the importance of their signatures and the processes used to count their votes. The lessons benefit county election agencies through better understanding of each other's practices and may encourage them to share information that improves outcomes. The results may further assist the California Secretary of State in developing guidelines that ensure consistency in the implementation of the EVCA to guarantee the highest integrity of our elections.

In the face of the current pandemic, this report further guides other states seeking to implement or enhance their own vote-by-mail operations. Voting-by-mail has risen to prominence as a solution in the November general election to mitigating voters' exposure to COVID-19. By lengthening the voting cycle, voting by mail protects the health of voters and poll workers by eliminating reliance on crowded polling places. This report can help other states decide how they may implement the hard-won lessons of California as they prepare to administer their elections in this unusual era of pandemic.

Appendices

Appendix I – Counties by Population Size 58

Appendix II - County Fact Sheets and Vote-by-Mail Ballot ID Return Envelopes 59
- Template 59
- Amador County 60
- Calaveras County 61
- Contra Costa County 62
- Del Norte County 63
- El Dorado County 64
- Fresno County 65
- Humboldt County 66
- Imperial County 67
- Kern County 68
- Lassen County 69
- Los Angeles County 70
- Madera County 71
- Marin County 72
- Merced County 73
- Modoc County 74
- Monterey County 75
- Napa County 76
- Orange County 77
- Plumas County 78
- Riverside County 79
- Sacramento County 80
- San Benito County 81
- San Diego County 82
- San Francisco County 83
- San Joaquin County 84
- San Luis Obispo County 85
- San Mateo County 86
- Santa Clara County 87
- Santa Cruz County 88
- Shasta County 89
- Solano County 90
- Sonoma County 91
- Ventura County 92
- Ventura County 93

Vote-by-Mail Ballot ID Return Envelopes 94
- Calaveras County 94
- Lassen County 95
- Madera County 96
- Plumas County 97
- Sacramento County 99
- San Diego County 100
- San Joaquin County 101
- San Mateo County 102
- Santa Clara County 104
- Santa Cruz County 105
- San Francisco County 106
- San Francisco County 107
- Shasta County 108
- Sonoma County 110

Appendix III - Automated Processes Vendors List 111

Appendix IV - Regression Results 112

Appendix I – Counties by Population Size

Small (<100K)
Medium (<500K, >=100K)
Large (>=500K)

County name	County size
Contra Costa	L
Fresno	L
Kern	L
Los Angeles	L
Orange	L
Riverside	L
Sacramento	L
San Diego	L
San Francisco	L
San Joaquin	L
San Mateo	L
Santa Clara	L
Sonoma	L
Ventura	L
El Dorado	M
Humboldt	M
Imperial	M
Madera	M
Marin	M
Merced	M
Monterey	M
Napa	M
San Luis Obispo	M
Santa Cruz	M
Shasta	M
Solano	M
Amador	S
Calaveras	S
Del Norte	S
Lassen	S
Modoc	S
Plumas	S
San Benito	S

Appendix II - County Fact Sheets and Vote-by-Mail Ballot ID Return Envelopes

33 COUNTIES SURVEYED

EVC COUNTY FACT SHEET TEMPLATE
INFORMATION FROM SOS OFFICE: sos.ca.gov/elections/map

County Name	**Template**
County Registrar/Clerk Name, Title(s)	Name, Title(s)
County Population	#
Number of Registered Voters	#
% Turnout 2018	%
% VBM Voters 2018	%
County Size	square miles
Community Type	Rural, Urban, Suburban
Size	Small (<100K), Medium (<500K), Large
Location	SW, SE, NW, NE, Central, Bay Area, Sacramento Area, LA Area
County Website	LINK; vote.ca.gov
County Demographics (race/ethnicity estimates from 2018 US Census)	H/L: Hispanic or Latino (%), B: Black or African American alone (%), W: White alone (%), AI: American Indian/Alaska Native alone (%), A: Asian alone (%), PI: Native Hawaiian/Other Pacific Islander alone (%), O/M: Two or More Races (%)
Use of Algorithms[1] 1 Defined as the use of technology to process and approve ballot signature verification without review from elections personnel.	Yes/No (YEAR, if applicable)
Vote Center County	Yes/No
Notification Methods Used/Accepted 2 Defined as county official going to voter to communicate challenged ballot status	Email, Phone, In-Person[2], Social Media, Mail, Fax, Other
Remedy Forms Used/Accepted 3 Defined as voter with completed cure letter dropping off form in-person at 1) county office, 2) county office dropbox or 3) active poll site or ballot drop-off site	Email, Phone, In-Person[3], Mail, Fax, Other

AMADOR COUNTY

County Name	Amador
County Registrar/Clerk Name, Title(s)	Kimberly Grady, Registrar of Voters
County Population	38,094
Number of Registered Voters	22,305
% Turnout 2018	79.73%
% VBM Voters 2018	71.94%
County Size	595 square miles
Community Type	Rural
Size	Small
Location	Sacramento Area
County Website	amadorgov.org/government/elections
County Demographics (race/ethnicity estimates from 2018 US Census)	H/L: 14.4%, B: 2.7%, W: 89.7%, AI: 2.3%, A: 1.7%, PI: 0.3%, O/M: 3.3%
Use of Algorithms	No
Vote Center County	Yes
Notification Methods Used/Accepted	Email, Phone, Mail
Remedy Forms Used/Accepted	In-Person, Mail, Other (visit by elections official)

CALAVERAS COUNTY

County Name	Calaveras
County Registrar/Clerk Name, Title(s)	Rebecca Turner
County Population	54,740
Number of Registered Voters	29,591
% Turnout 2018	74.1%
% VBM Voters 2018	74.96%
County Size	1,020 square miles
Community Type	Rural
Size	Small
Location	Central
County Website	elections.calaverasgov.us
County Demographics (race/ethnicity estimates from 2018 US Census)	H/L: 12.4%, B: 1.0%, W: 91.2%, AI: 1.9%, A: 1.7%, PI: 0.3%, O/M: 3.9%
Use of Algorithms	No
Vote Center County	Yes
Notification Methods Used/Accepted	Email, Phone, Mail, Fax
Remedy Forms Used/Accepted	In-Person, Mail

CONTRA COSTA COUNTY

County Name	Contra Costa
County Registrar/Clerk Name, Title(s)	Debi Cooper, County Clerk
County Population	1,149,363
Number of Registered Voters	621,309
% Turnout 2018	68.14%
% VBM Voters 2018	68.60%
County Size	716 square miles
Community Type	Suburban
Size	Large
Location	Bay Area
County Website	cocovote.us
County Demographics (race/ethnicity estimates from 2018 US Census)	H/L: 25.8%, B: 9.5%, W: 65.5%, AI: 1.0%, A: 18.0%, PI: 0.6%, O/M: 5.3%
Use of Algorithms	No
Vote Center County	No
Notification Methods Used/Accepted	Mail
Remedy Forms Used/Accepted	Email, In-Person, Mail, Fax

DEL NORTE COUNTY

County Name	Del Norte
County Registrar/Clerk Name, Title(s)	Alissia Northrup, County Clerk-Recorder
County Population	27,221
Number of Registered Voters	14,150
% Turnout 2018	59.64%
% VBM Voters 2018	65.66%
County Size	square miles
Community Type	Rural
Size	Small
Location	NW
County Website	co.del-norte.ca.us/departments/clerk-recorder/elections
County Demographics (race/ethnicity estimates from 2018 US Census)	H/L: 20.0%, B: 3.5%, W: 78.4%, AI: 9.3%, A: 3.1%, PI: 0.2%, O/M: 5.4%
Use of Algorithms	No
Vote Center County	No
Notification Methods Used/Accepted	Email, Mail, Other (text message)
Remedy Forms Used/Accepted	Email, In-Person, Mail

EL DORADO COUNTY

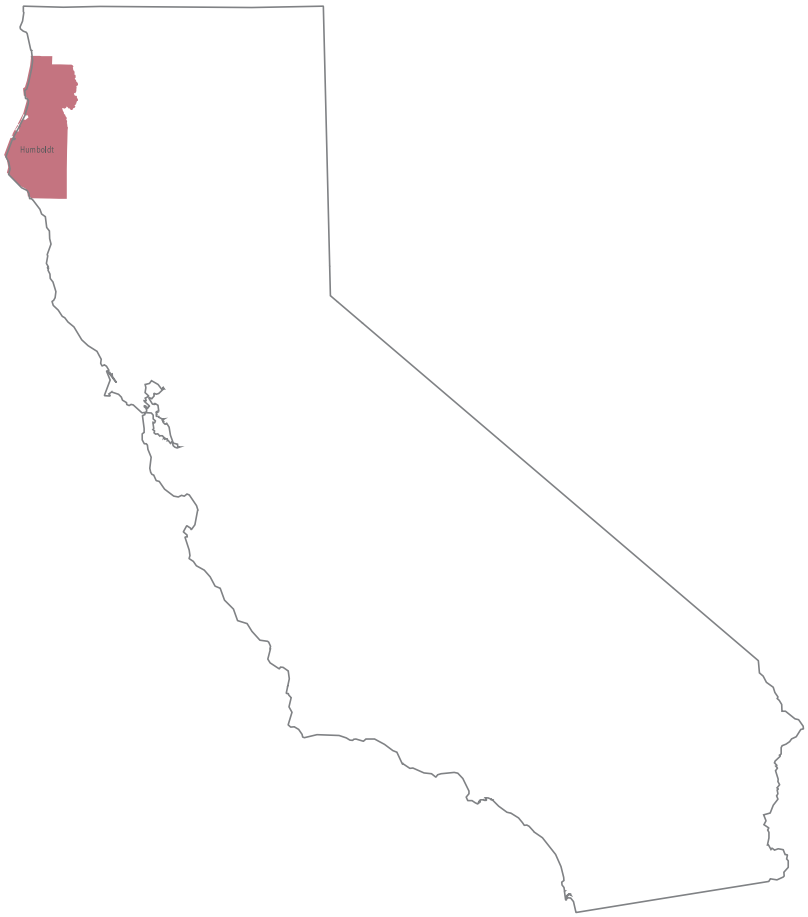
County Name	**El Dorado**
County Registrar/Clerk Name, Title(s)	Bill O'Neill, Recorder-Clerk/Registrar of Voters
County Population	188,399
Number of Registered Voters	121,192
% Turnout 2018	74.86%
% VBM Voters 2018	79.04%
County Size	square miles
Community Type	Suburban
Size	Medium
Location	Sacramento Area
County Website	edcgov.us/Government/Elections
County Demographics (race/ethnicity estimates from 2018 US Census)	H/L: 12.9%, B: 1.0%, W: 88.9%, AI: 1.3%, A: 4.7%, PI: 0.2%, O/M: 3.8%
Use of Algorithms	No
Vote Center County	No
Notification Methods Used/Accepted	Mail
Remedy Forms Used/Accepted	In-Person, Mail

FRESNO COUNTY

County Name	**Fresno**
County Registrar/Clerk Name, Title(s)	Brandi Orth, County Clerk/Registrar of Voters
County Population	1,007,229
Number of Registered Voters	456,891
% Turnout 2018	56.24%
% VBM Voters 2018	63.58%
County Size	square miles
Community Type	Suburban/Rural
Size	Large
Location	Central
County Website	co.fresno.ca.us/departments/county-clerk-registrar-of-voters
County Demographics (race/ethnicity estimates from 2018 US Census)	H/L: 53.5%, B: 5.8%, W: 76.7%, AI: 3.0%, A: 11.0%, PI: 0.3%, O/M: 3.2%
Use of Algorithms	No
Vote Center County	Yes
Notification Methods Used/Accepted	In-Person, Mail
Remedy Forms Used/Accepted	In-Person, Mail

HUMBOLDT COUNTY

County Name	**Humboldt**
County Registrar/Clerk Name, Title	Kelly Sanders, Clerk, Recorder and Registrar of Voters
County Population	136,002
Number of Registered Voters	78,518
% Turnout 2018	68.05%
% VBM Voters 2018	66.51%
# Votes Rejected for signature mismatch	168
# Votes Cured via remedy	64
% Cure Rate	38%
County Size	3,568 square miles
Community Type	Rural
Size	Medium
Location	NW
County Website	humboldtgov.org/890/Elections-Voter-Registration
County Demographics (race/ethnicity estimates from 2018 US Census)	H/L: 11.8%, B: 1.4%, W: 83.4%, AI: 6.3%, A: 2.9%, PI: 0.3%, O/M: 5.7%
Use of Algorithms	No
Vote Center County	No
Notification methods used/accepted	Mail
Remedy forms used/accepted	Email, In-Person, Mail, Fax



IMPERIAL COUNTY

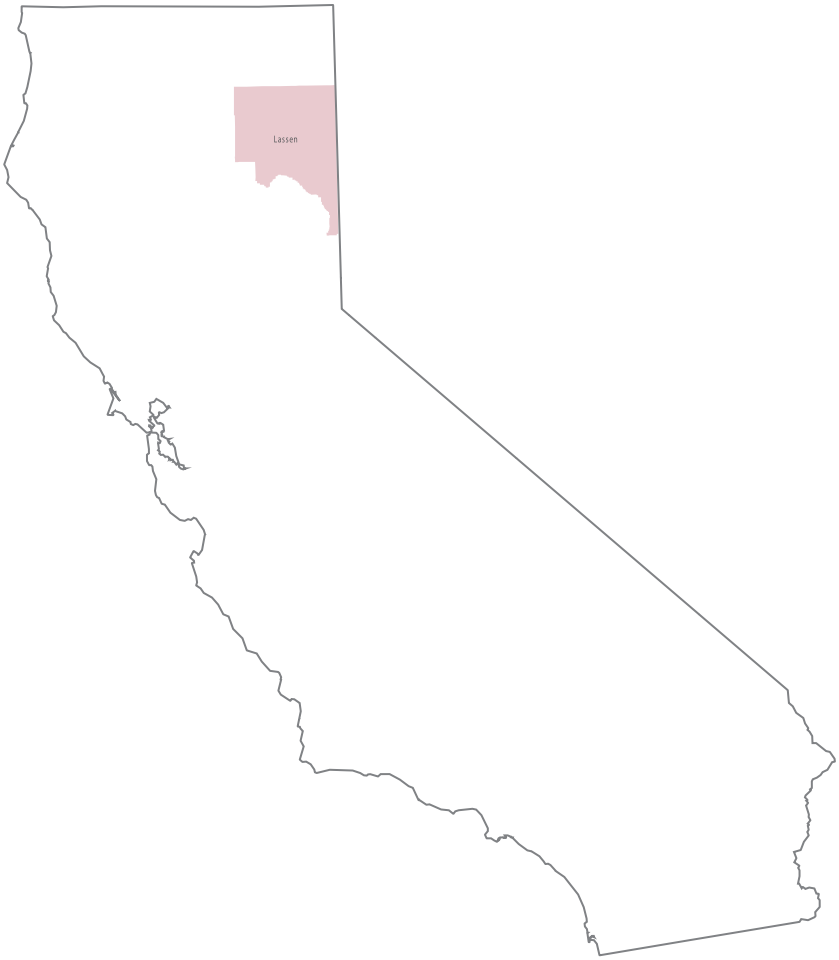
County Name	**Imperial**
County Registrar/Clerk Name, Title	Debra Porter, Registrar of Voters
County Population	190,624
Number of Registered Voters	69,728
% Turnout 2018	48.61%
% VBM Voters 2018	61.93%
County Size	4,177 square miles
Community Type	Rural
Size	Medium
Location	SE
County Website	co.imperial.ca.us/regvoters
County Demographics (race/ethnicity estimates from 2018 US Census)	H/L: 11.8%, B: 1.4%, W: 83.4%, AI: 6.3%, A: 2.9%, PI: 0.3%, O/M: 5.7%
Use of Algorithms	No
Vote Center County	No
Notification Methods Used/Accepted	Email, Phone, Mail
Remedy Forms Used/Accepted	Email, In-Person, Mail, Fax

KERN COUNTY

County Name	Kern
County Registrar/Clerk Name, Title	Mary Bedard, Auditor-Controller/County Clerk/Registrar of Voters
County Population	905,801
Number of Registered Voters	375,881
% Turnout 2018	54.76%
% VBM Voters 2018	65.30%
County Size	8,132 square miles
Community Type	Suburban
Size	Large
Location	SW
County Website	kernvote.com
County Demographics (race/ethnicity estimates from 2018 US Census)	H/L: 54.0%, B: 6.3%, W: 82.3%, AI: 2.6%, A: 5.4%, PI: 0.3%, O/M: 3.1%
Use of Algorithms	No
Vote Center County	No
Notification Methods Used/Accepted	Mail
Remedy Forms Used/Accepted	In-Person, Mail, Email, Fax

LASSEN COUNTY

County Name	Lassen
County Registrar/Clerk Name, Title	Julie Bustamante, County Clerk-Recorder
County Population	30,911
Number of Registered Voters	14,332
% Turnout 2018	63.72%
% VBM Voters 2018	44.80%
County Size	square miles
Community Type	4,541 Rural
Size	Small
Location	NE
County Website	lassencounty.org/dept/county-clerk-recorder/county-clerk-recorder
County Demographics (race/ethnicity estimates from 2018 US Census)	H/L: 19.2%, B: 8.3%, W: 81.1%, AI: 4.3%, A: 1.6%, PI: 0.9%, O/M: 3.8%
Use of Algorithms	No
Vote Center County	No
Notification Methods Used/Accepted	Email, Phone, In-Person, Social Media, Mail
Remedy Forms Used/Accepted	Email, Phone, In-Person, Mail, Fax



LOS ANGELES COUNTY

County Name	**Los Angeles**
County Registrar/Clerk Name, Title	Dean Logan, Registrar - Recorder/County Clerk
County Population	10,283,729
Number of Registered Voters	5,280,658
% Turnout 2018	57.25%
% VBM Voters 2018	44.66%
County Size	4,058 square miles
Community Type	Urban
Size	Large
Location	SW
County Website	lavote.net
County Demographics (race/ethnicity estimates from 2018 US Census)	H/L: 48.6%, B: 9.0%, W: 70.8%, AI: 1.4%, A: 15.4%, PI: 0.4%, O/M: 3.1%
Use of Algorithms	Yes (2007)
Vote Center County	Yes
Notification Methods Used/Accepted	Email, Phone, Mail
Remedy Forms Used/Accepted	Email, In-Person, Mail, Fax

MADERA COUNTY

County Name	Madera
County Registrar/Clerk Name, Title	Rebecca Martinez, County Clerk-Recorder
County Population	158,894
Number of Registered Voters	57,418
% Turnout 2018	67.87%
% VBM Voters 2018	88.62%
County Size	2,137 square miles
Community Type	Rural
Size	Medium
Location	Central
County Website	maderacounty.com/government/county-clerk-recorder-elections/elections-registrar-of-voters
County Demographics (race/ethnicity estimates from 2018 US Census)	H/L: 58.3%, B: 4.3%, W: 86.0%, AI: 4.4%, A: 2.5%, PI: 0.3%, O/M: 2.5%
Use of Algorithms	No
Vote Center County	Yes
Notification Methods Used/Accepted	Mail
Remedy Forms Used/Accepted	Mail

MARIN COUNTY

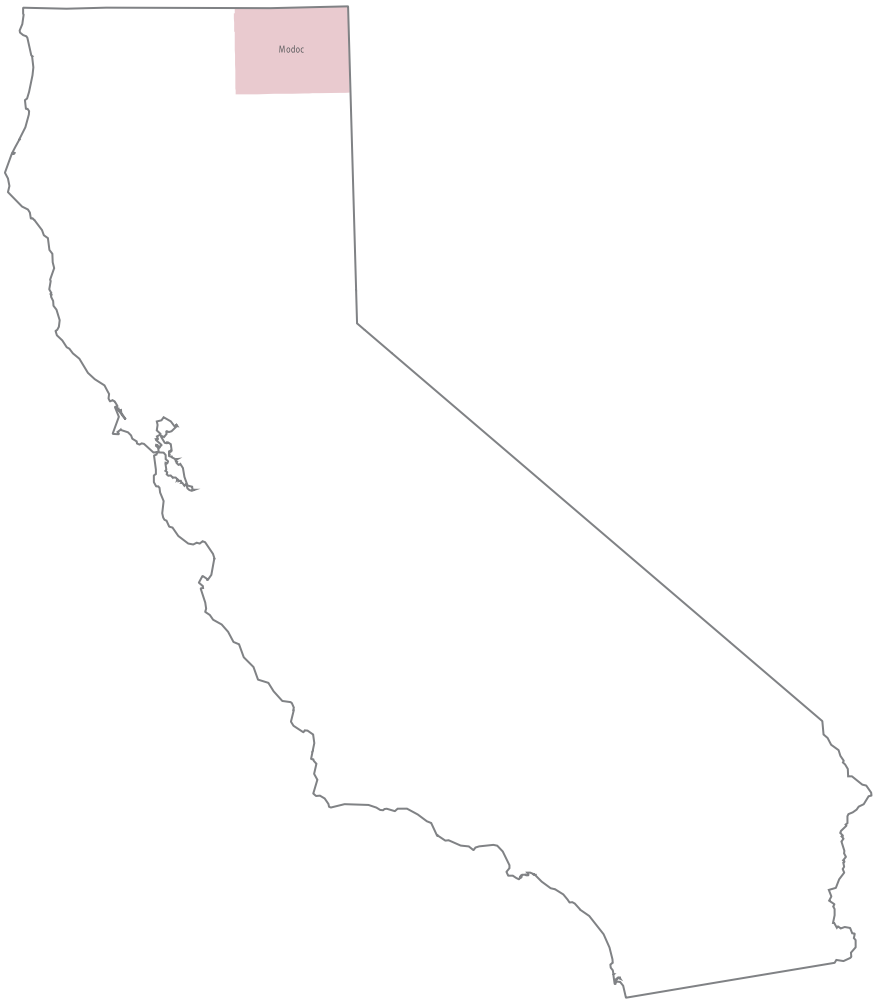
County Name	Marin
County Registrar/Clerk Name, Title	Lynda Roberts, Registrar of Voters
County Population	263,886
Number of Registered Voters	160,944
% Turnout 2018	82.29%
% VBM Voters 2018	73.58%
County Size	520 square miles
Community Type	Suburban
Size	Medium
Location	Bay Area
County Website	marincounty.org/depts/rv
County Demographics (race/ethnicity estimates from 2018 US Census)	H/L: 16.1%, B: 2.8%, W: 85.5%, AI: 1.0%, A: 6.5%, PI: 0.3%, O/M: 4.0%
Use of Algorithms	Yes (2014)
Vote Center County	No
Notification Methods Used/Accepted	Mail
Remedy Forms Used/Accepted	In-Person, Mail

MERCED COUNTY

County Name	Merced
County Registrar/Clerk Name, Title	Barbara J. Levey, Registrar of Voters
County Population	279,977
Number of Registered Voters	97,584
% Turnout 2018	61.66%
% VBM Voters 2018	55.13%
County Size	1,935 square miles
Community Type	Suburban
Size	Medium
Location	Central
County Website	www.mercedelections.org
County Demographics (race/ethnicity estimates from 2018 US Census)	H/L: 60.2%, B: 4.0%, W: 82.0%, AI: 2.5%, A: 7.9%, PI: 0.4%, O/M: 3.2%
Use of Algorithms	Yes (2011)
Vote Center County	No
Notification Methods Used/Accepted	Email, Phone, Mail
Remedy Forms Used/Accepted	Email, Mail, Fax

MODOC COUNTY

County Name	Modoc
County Registrar/Clerk Name, Title	Stephanie Wellemeyer, County Auditor/ Clerk/Recorder
County Population	9,612
Number of Registered Voters	5,118
% Turnout 2018	68.33%
% VBM Voters 2018	77.84%
County Size	3,918 square miles
Community Type	Rural
Size	Small
Location	NE
County Website	co.modoc.ca.us/departments/elections
County Demographics (race/ethnicity estimates from 2018 US Census)	H/L: 14.2%, B: 1.4%, W: 88.3%, AI: 5.0%, A: 1.3%, PI: 0.3%, O/M: 3.7%
Use of Algorithms	No
Vote Center County	No
Notification Methods Used/Accepted	Email, Phone, Mail
Remedy Forms Used/Accepted	In-Person, Mail, Fax



MONTEREY COUNTY

County Name	Monterey
County Registrar/Clerk Name, Title	Claudio Valenzuela, Registrar of Voters
County Population	433,281
Number of Registered Voters	187,350
% Turnout 2018	62.79%
% VBM Voters 2018	75.96%
County Size	3,381 square miles
Community Type	Rural/Suburban
Size	Medium
Location	Central
County Website	montereycountyelections.us
County Demographics (race/ethnicity estimates from 2018 US Census)	H/L: 59.1%, B: 3.5%, W: 82.7%, AI: 2.6%, A: 6.8%, PI: 0.6%, O/M: 3.8%
Use of Algorithms	Yes (2018)
Vote Center County	No
Notification Methods Used/Accepted	Email, Phone, Mail
Remedy Forms Used/Accepted	Email, In-Person, Mail, Fax

NAPA COUNTY

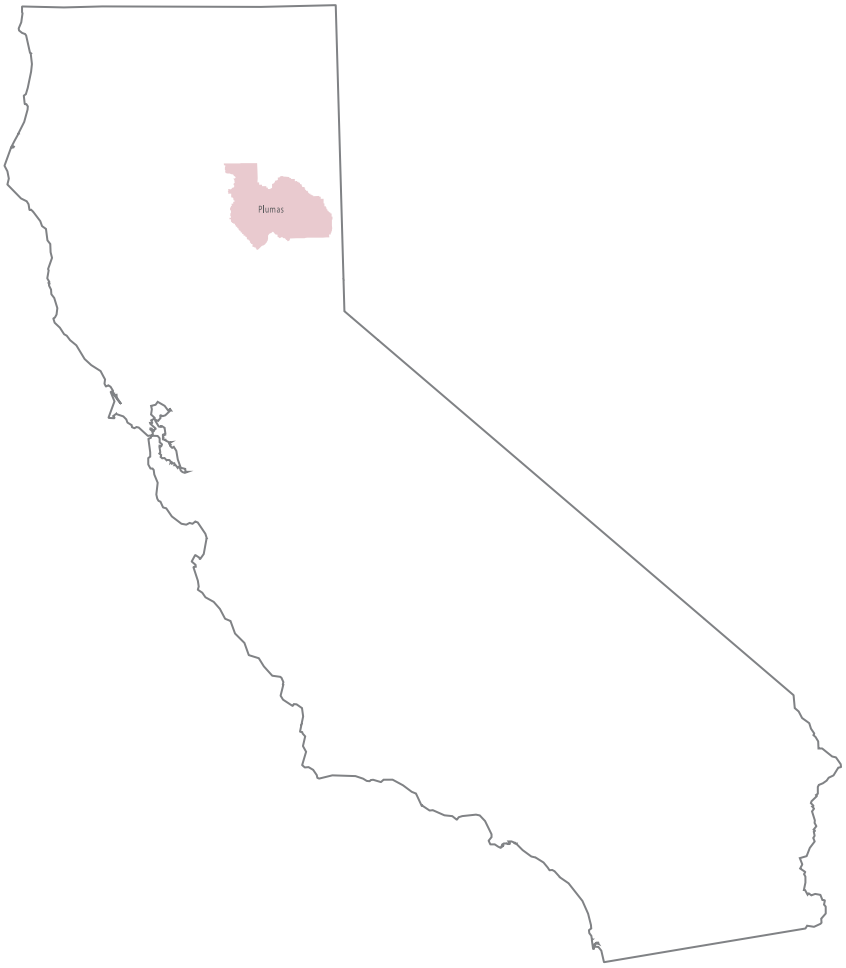
County Name	Napa
County Registrar/Clerk Name, Title	John Tuteur, Assessor-Recorder-County Clerk
County Population	141,294
Number of Registered Voters	78,135
% Turnout 2018	73.12%
% VBM Voters 2018	99.93%
County Size	748 square miles
Community Type	Rural
Size	Medium
Location	Bay Area
County Website	countyofnapa.org/396/Elections
County Demographics (race/ethnicity estimates from 2018 US Census)	H/L: 34.5%, B: 2.5%, W: 83.8%, AI: 1.3%, A: 8.8%, PI: 0.4%, O/M: 3.3%
Use of Algorithms	No
Vote Center County	Yes
Notification Methods Used/Accepted	Email, Phone, Mail
Remedy Forms Used/Accepted	Email, In-Person, Mail

ORANGE COUNTY

County Name	Orange
County Registrar/Clerk Name, Title	Neal Kelley, Registrar of Voters
County Population	3,221,103
Number of Registered Voters	1,560,111
% Turnout 2018	70.94%
% VBM Voters 2018	64.45%
County Size	791 square miles
Community Type	Urban
Size	Large
Location	SW
County Website	ocvote.com/vc/web
County Demographics (race/ethnicity estimates from 2018 US Census)	H/L: 34.2%, B: 2.1%, W: 71.5%, AI: 1.0%, A: 21.4%, PI: 0.4%, O/M: 3.5%
Use of Algorithms	No
Vote Center County	Yes
Notification Methods Used/Accepted	Mail
Remedy Forms Used/Accepted	Email, In-Person, Mail, Fax

PLUMAS COUNTY

County Name	**Plumas**
County Registrar/Clerk Name, Title	Kathy Williams, County Clerk-Recorder-Registrar of Voters
County Population	19,773
Number of Registered Voters	12,480
% Turnout 2018	75.24%
% VBM Voters 2018	100%
County Size	2,553 square miles
Community Type	Rural
Size	Small
Location	NE
County Website	voteinfo.net
County Demographics (race/ethnicity estimates from 2018 US Census)	H/L: 9.2%, B: 1.0%, W: 90.8%, AI: 3.1%, A: 1.2%, PI: 0.1%, O/M: 3.7%
Use of Algorithms	No
Vote Center County	No
Notification Methods Used/Accepted	Email, Phone, Mail
Remedy Forms Used/Accepted	Email, In-Person, Mail, Fax



RIVERSIDE COUNTY

County Name	Riverside
County Registrar/Clerk Name, Title	Rebecca Spencer, Registrar of Voters
County Population	2,415,955
Number of Registered Voters	1,035,957
% Turnout 2018	62.80%
% VBM Voters 2018	70.09%
County Size	7,206 square miles
Community Type	Suburban
Size	Large
Location	SE
County Website	https://www.voteinfo.net/
County Demographics (race/ethnicity estimates from 2018 US Census)	H/L: 49.6%, B: 7.2%, W: 79.7%, AI: 1.9%, A: 7.1%, PI: 0.4%, O/M: 3.6%
Use of Algorithms	No
Vote Center County	No
Notification Methods Used/Accepted	Mail
Remedy Forms Used/Accepted	Email, In-Person, Mail

SACRAMENTO COUNTY

County Name	Sacramento
County Registrar/Clerk Name, Title	Courtney Bailey-Kanelos, Registrar of Voters
County Population	1,529,501
Number of Registered Voters	765,965
% Turnout 2018	68.23%
% VBM Voters 2018	94.21%
County Size	965 square miles
Community Type	Urban
Size	Large
Location	Sacramento Area
County Website	elections.saccounty.net/Pages/default.aspx
County Demographics (race/ethnicity estimates from 2018 US Census)	H/L: 23.4%, B: 10.9%, W: 63.0%, AI: 1.5%, A: 16.9%, PI: 1.3%, O/M: 6.4%
Use of Algorithms	No
Vote Center County	Yes
Notification Methods Used/Accepted	Email, Phone, Mail
Remedy Forms Used/Accepted	Email, In-Person, Mail

SAN BENITO COUNTY

County Name	San Benito
County Registrar/Clerk Name, Title	Joe Paul Gonzalez, County Clerk-Auditor-Recorder
County Population	57,088
Number of Registered Voters	30,064
% Turnout 2018	68.49%
% VBM Voters 2018	85.16%
County Size	1,389 square miles
Community Type	Rural
Size	Small
Location	Central
County Website	sbcvote.us/registrar-of-voters
County Demographics (race/ethnicity estimates from 2018 US Census)	H/L: 60.6%, B: 1.5%, W: 87.9%, AI: 3.1%, A: 3.6%, PI: 0.4%, O/M: 3.5%
Use of Algorithms	No
Vote Center County	No
Notification Methods Used/Accepted	Email, Phone, In-Person, Mail, Other (contact relatives of voter)
Remedy Forms Used/Accepted	In-Person, Mail

SAN DIEGO COUNTY

County Name	San Diego
County Registrar/Clerk Name, Title	Michael Vu, Registrar of Voters
County Population	3,337,456
Number of Registered Voters	1,741,707
% Turnout 2018	67.40%
% VBM Voters 2018	68.51%
County Size	4,207 square miles
Community Type	Urban
Size	Large
Location	SW
County Website	sdvote.com
County Demographics (race/ethnicity estimates from 2018 US Census)	H/L: 34.0%, B: 5.5%, W: 75.5%, AI: 1.3%, A: 12.6%, PI: 0.6%, O/M: 4.5%
Use of Algorithms	Yes (2010, updated system 2018)
Vote Center County	No
Notification Methods Used/Accepted	Email, In-Person, Mail
Remedy Forms Used/Accepted	Email, In-Person, Fax

SAN FRANCISCO COUNTY

County Name	San Francisco
County Registrar/Clerk Name, Title	John Arntz, Director of Elections
County Population	883,963
Number of Registered Voters	500,051
% Turnout 2018	74.56%
% VBM Voters 2018	65.70%
County Size	47 square miles
Community Type	Urban
Size	Large
Location	Bay Area
County Website	sfelections.sfgov.org
County Demographics (race/ethnicity estimates from 2018 US Census)	H/L: 15.2%, B: 5.6%, W: 52.9%, AI: 0.7%, A: 35.9%, PI: 0.5%, O/M: 4.4%
Use of Algorithms	No
Vote Center County	No
Notification Methods Used/Accepted	Email, Phone, Mail
Remedy Forms Used/Accepted	Email, In-Person, Mail

SAN JOAQUIN COUNTY

County Name	San Joaquin
County Registrar/Clerk Name, Title	Michelle Dubroff, Registrar of Voters
County Population	758,744
Number of Registered Voters	344,891
% Turnout 2018	57.01%
% VBM Voters 2018	71.13%
County Size	1,391 square miles
Community Type	Suburban
Size	Large
Location	Central
County Website	sjgov.org/department/rov
County Demographics (race/ethnicity estimates from 2018 US Census)	H/L: 41.9%, B: 8.3%, W: 66.5%, AI: 2.0%, A: 17.0%, PI: 0.8%, O/M: 5.4%
Use of Algorithms	No
Vote Center County	No
Notification Methods Used/Accepted	Mail
Remedy Forms Used/Accepted	In-Person, Mail

SAN LUIS OBISPO COUNTY

County Name	**San Luis Obispo (SLO)**
County Registrar/Clerk Name, Title	Tommy Gong, County Clerk-Recorder
County Population	280,101
Number of Registered Voters	172,544
% Turnout 2018	74.39%
% VBM Voters 2018	75.65%
County Size	3,299 square miles
Community Type	Rural
Size	Medium
Location	Central
County Website	slocounty.ca.gov/Departments/Clerk-Recorder/Elections-and-Voting.aspx
County Demographics (race/ethnicity estimates from 2018 US Census)	H/L: 22.8%, B: 2.1%, W: 88.8%, AI: 1.4%, A: 4.0%, PI: 0.2%, O/M: 3.6%
Use of Algorithms	No
Vote Center County	No
Notification Methods Used/Accepted	Mail
Remedy Forms Used/Accepted	Email, In-Person, Mail, Fax

SAN MATEO COUNTY

County Name	San Mateo
County Registrar/Clerk Name, Title	Mark Church, Chief Elections Officer & Assessor-County Clerk-Recorder
County Population	774,155
Number of Registered Voters	399,351
% Turnout 2018	72.63%
% VBM Voters 2018	88.28%
County Size	448 square miles
Community Type	Urban
Size	Large
Location	Bay Area
County Website	smcacre.org/elections
County Demographics (race/ethnicity estimates from 2018 US Census)	H/L: 24.3%, B: 2.7%, W: 60.0%, AI: 0.9%, A: 30.1%, PI: 1.5%, O/M: 4.7%
Use of Algorithms	No* (but exploring)
Vote Center County	Yes
Notification Methods Used/Accepted	Email, Phone, In-Person, Mail
Remedy Forms Used/Accepted	Email, In-Person, Mail

SANTA CLARA COUNTY

County Name	Santa Clara
County Registrar/Clerk Name, Title	Shannon Bushey, Registrar of Voters
County Population	1,956,598
Number of Registered Voters	885,764
% Turnout 2018	70.61%
% VBM Voters 2018	77.86%
County Size	1,290 square miles
Community Type	Urban
Size	Large
Location	Bay Area
County Website	sccgov.org/sites/rov/Pages/Registrar-of-Voters.aspx
County Demographics (race/ethnicity estimates from 2018 US Census)	H/L: 25.3%, B: 2.8%, W: 53.1%, AI: 1.2%, A: 38.3%, PI: 0.5%, O/M: 4.1%
Use of Algorithms	No
Vote Center County	Yes
Notification Methods Used/Accepted	Mail, Other (follow-up, reminder letter)
Remedy Forms Used/Accepted	Email, In-Person, Mail, Fax

SANTA CRUZ COUNTY

County Name	Santa Cruz
County Registrar/Clerk Name, Title	Gail Pellerin, County Clerk
County Population	276,864
Number of Registered Voters	159,499
% Turnout 2018	76.30%
% VBM Voters 2018	68.09%
County Size	445 square miles
Community Type	Rural
Size	Medium
Location	Bay Area
County Website	votescount.com
County Demographics (race/ethnicity estimates from 2018 US Census)	H/L: 34.1%, B: 1.4%, W: 87.1%, AI: 1.9%, A: 5.2%, PI: 0.2%, O/M: 4.2%
Use of Algorithms	No
Vote Center County	No
Notification Methods Used/Accepted	Email, Phone, In-Person, Social Media, Mail
Remedy Forms Used/Accepted	Email, In-Person, Social Media, Mail, Other (text picture of additional signature)

SHASTA COUNTY

County Name	**Shasta**
County Registrar/Clerk Name, Title	Cathy Darling Allen, County Clerk
County Population	178,271
Number of Registered Voters	101,782
% Turnout 2018	69.61%
% VBM Voters 2018	68.54%
County Size	3,775 square miles
Community Type	Rural
Size	Medium
Location	NW
County Website	elections.co.shasta.ca.us
County Demographics (race/ethnicity estimates from 2018 US Census)	H/L: 10.3%, B: 1.2%, W: 87.8%, AI: 3.2%, A: 3.1%, PI: 0.2%, O/M: 4.5%
Use of Algorithms	No
Vote Center County	No
Notification Methods Used/Accepted	Email, Phone, Social Media, Mail
Remedy Forms Used/Accepted	Email, Phone, In-Person, Mail

SOLANO COUNTY

County Name	Solano
County Registrar/Clerk Name, Title	Timothy Flanagan, Registrar of Voters
County Population	439,793
Number of Registered Voters	231,510
% Turnout 2018	64.08%
% VBM Voters 2018	69.11%
County Size	822 square miles
Community Type	Suburban
Size	Medium
Location	Sacramento Area
County Website	solanocounty.com/depts/rov
County Demographics (race/ethnicity estimates from 2018 US Census)	H/L: 26.9%, B: 14.8%, W: 59.7%, AI: 1.3%, A: 16.2%, PI: 1.0%, O/M: 7.0%
Use of Algorithms	No
Vote Center County	No
Notification Methods Used/Accepted	Email, Phone, Mail, Other (text message)
Remedy Forms Used/Accepted	Email, In-Person,Mail

SONOMA COUNTY

County Name	Sonoma
County Registrar/Clerk Name, Title	Deva Marie Proto, County Clerk, Recorder, Assessor, Registrar of Voters
County Population	503,332
Number of Registered Voters	274,292
% Turnout 2018	77.97%
% VBM Voters 2018	80.07%
County Size	1,576 square miles
Community Type	Rural
Size	Large
Location	NW
County Website	sonomacounty.ca.gov/CRA/Registrar-of-Voters/Elections
County Demographics (race/ethnicity estimates from 2018 US Census)	H/L: 27.2%, B: 2.1%, W: 86.8%, AI: 2.2%, A: 4.6%, PI: 0.4%, O/M: 4.0%
Use of Algorithms	Yes (2009)
Vote Center County	No
Notification Methods Used/Accepted	Phone, Mail
Remedy Forms Used/Accepted	Email, Phone, In-Person, Mail, Fax

VENTURA COUNTY

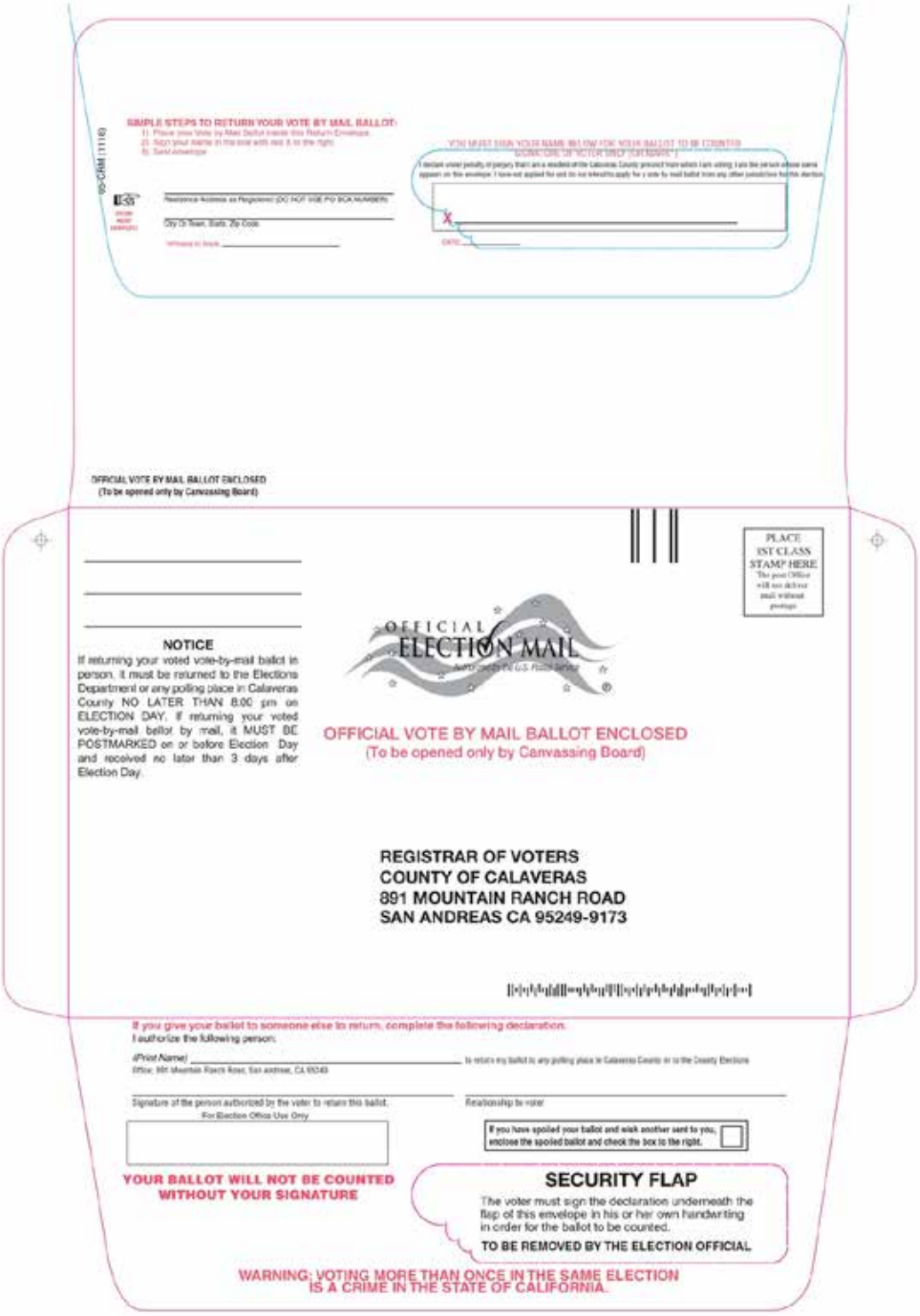
County Name	Ventura
County Registrar/Clerk Name, Title	Mark A. Lunn, County Clerk, Recorder, Registrar of Voters
County Population	859,073
Number of Registered Voters	448,174
% Turnout 2018	70.03%
% VBM Voters 2018	63.28%
County Size	1,843 square miles
Community Type	Suburban
Size	Large
Location	SW
County Website	recorder.countyofventura.org/elections/elections
County Demographics (race/ethnicity estimates from 2018 US Census)	H/L: 43.0%, B: 2.4%, W: 84.1%, AI: 1.9%, A: 7.9%, PI: 0.3%, O/M: 3.5%
Use of Algorithms	Yes (2005)
Vote Center County	No
Notification Methods Used/Accepted	Email, Phone
Remedy Forms Used/Accepted	Email, Phone, In-Person, Mail

VENTURA COUNTY

County Name	Ventura
County Registrar/Clerk Name, Title	Mark A. Lunn, County Clerk, Recorder, Registrar of Voters
County Population	859,073
Number of Registered Voters	448,174
% Turnout 2018	70.03%
% VBM Voters 2018	63.28%
County Size	1,843 square miles
Community Type	Suburban
Size	Large
Location	SW
County Website	recorder.countyofventura.org/elections/elections
County Demographics (race/ethnicity estimates from 2018 US Census)	H/L: 43.0%, B: 2.4%, W: 84.1%, AI: 1.9%, A: 7.9%, PI: 0.3%, O/M: 3.5%
Use of Algorithms	Yes (2005)
Vote Center County	No
Notification Methods Used/Accepted	Email, Phone
Remedy Forms Used/Accepted	Email, Phone, In-Person, Mail

Vote-by-Mail Ballot ID Return Envelopes

Calaveras County



Lassen County

PP1907041 B
County: Lassen
Type: Reply
Size: 5.875 x 9.125

PMS: 7728 Black
Qty: 12,000
Stock: 24 White Wove
Black Tint

9 ⅛"

5⅜"

1½"

I declare under penalty of perjury that I am a resident of the Lassen County precinct from which I am voting; I am the person whose name appears on this envelope; I have not applied for and do not intend to apply for a vote-by-mail ballot from any other jurisdiction for this election.

YOU MUST SIGN YOUR NAME BELOW FOR YOUR BALLOT TO BE COUNTED. SIGNATURE OF VOTER ONLY (OR MARK*)

X _____ Signature (DO NOT PRINT) _____ Date _____ *Witness Signature: If voter is unable to sign, he or she may make a mark witnessed by one person.

_____ Home Address or Residence Address (Do not use PO Box)

By law, the signature on this envelope will be matched and verified against the signature on the voter's registration card.

YOUR BALLOT WILL NOT BE COUNTED WITHOUT YOUR SIGNATURE

If you have spoiled your ballot and want another, call the number below.

LASSEN COUNTY ELECTIONS OFFICE
530-251-8217 Toll Free 866-742-8445

CALASDEN BRM REPLY 070119

Return Envelope
Official Ballot

To be opened only by Canvassing Board

Drop off your ballot before 8pm on Election Day.

Mail your ballot so that it is postmarked by Election Day.

OFFICIAL ELECTION MAIL
Authorized by the U.S. Postal Service

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL
FIRST-CLASS MAIL PERMIT NO. 2 SUSANVILLE, CA

POSTAGE WILL BE PAID BY ADDRESSEE

REGISTRAR OF VOTERS
LASSEN COUNTY ELECTIONS
220 S LASSEN ST. STE. 5
SUSANVILLE CA 96130-9909

If you give your ballot to someone else to return, complete the following declaration.

I, the voter, hereby affirm that I authorize the following person:

(Print Name) _____ who is my spouse, child, parent, grandparent, grandchild, brother, sister or any person residing in the same household to return my ballot to any polling place in Lassen County or to the Lassen County Elections Office, 220 S Lassen St., Suite 5, Susanville, CA 96130.

Signature of the person authorized by the voter to return this ballot.

WARNING: VOTING MORE THAN ONCE IN THE SAME ELECTION IS A CRIME IN THE STATE OF CALIFORNIA.

Madera County

MADERA COUNTY

Return Envelope
Official Ballot
To be opened only by
Canvassing Board

Sobre de Retorno
Boleta Oficial
Para ser abierto únicamente
por la Junta de Escrutinio

Ballots must be postmarked on or before Election Day and received within three days of the Election to be considered timely.

Boletas deben ser matasellada en o antes del día de las elecciones y recibidas dentro de tres días de las elecciones para deber ser considerada oportuna.

20-IBF-0320

OFFICIAL ELECTION MAIL
Authorized by the U.S. Postal Service

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL
FIRST-CLASS MAIL PERMIT NO. 10 MADERA CA

POSTAGE WILL BE PAID BY ADDRESSEE

ELECTIONS DIVISION
MADERA COUNTY CLERK-RECORDER
200 W 4TH ST
MADERA CA 93637-9901

MADERA COUNTY - RETURN 5.875" X 10" Proof #2

I authorize the person below to return my ballot:

Their name _____
Their Signature _____
Relationship to voter _____

☐ **Check this box if you made a mistake. A replacement ballot will be sent to you.**
Marque esta caja si usted hizo un error. Una boleta electoral reemplazante será mandada a usted.

Autorizo a la persona abajo a devolver mi boleta:

Su Nombre _____
Su firma _____
Relación con el votante _____

Presidential Primary Election - March 3, 2020
Elección Presidencial Primaria - 3 de Marzo de 2020

VOTING MORE THAN ONCE IN THE SAME ELECTION IS A CRIME.

EL VOTAR MÁS DE UNA VEZ EN LA MISMA ELECCIÓN CONSTITUYE UN DELITO.

DECLARATION: I am a resident of and a voter in the precinct, and the person whose name appears on this envelope. I have not applied for nor intend to apply for a vote by mail ballot from any other jurisdiction for the same election. I declare under penalty of perjury that my declaration is true and correct.

DECLARACIÓN: Soy residente de este distrito electoral, voto en el mismo y mi nombre aparece en este sobre. No he solicitado ni pienso solicitar en ninguna otra jurisdicción para la misma elección una boleta electoral de votar por correo. Declaro bajo pena de purjurio que la presente es una declaración fiel y exacta.

Your ballot will not be counted unless you sign below in your own handwriting and your signature compares with your signature on your voter registration card.

No se contará su boleta electoral a menos que firme más adelante de su puño y letra y a menos que su firma coincida con la misma como aparece en la tarjeta de inscripción del elector.

SIGN HERE / FIRMA AQUI

Signature DO NOT PRINT (Power of Attorney not acceptable)
Firma NO ESCRIBA EN LETRA DE MOLDE (no se aceptan cartas de poder)

Date
Fecha

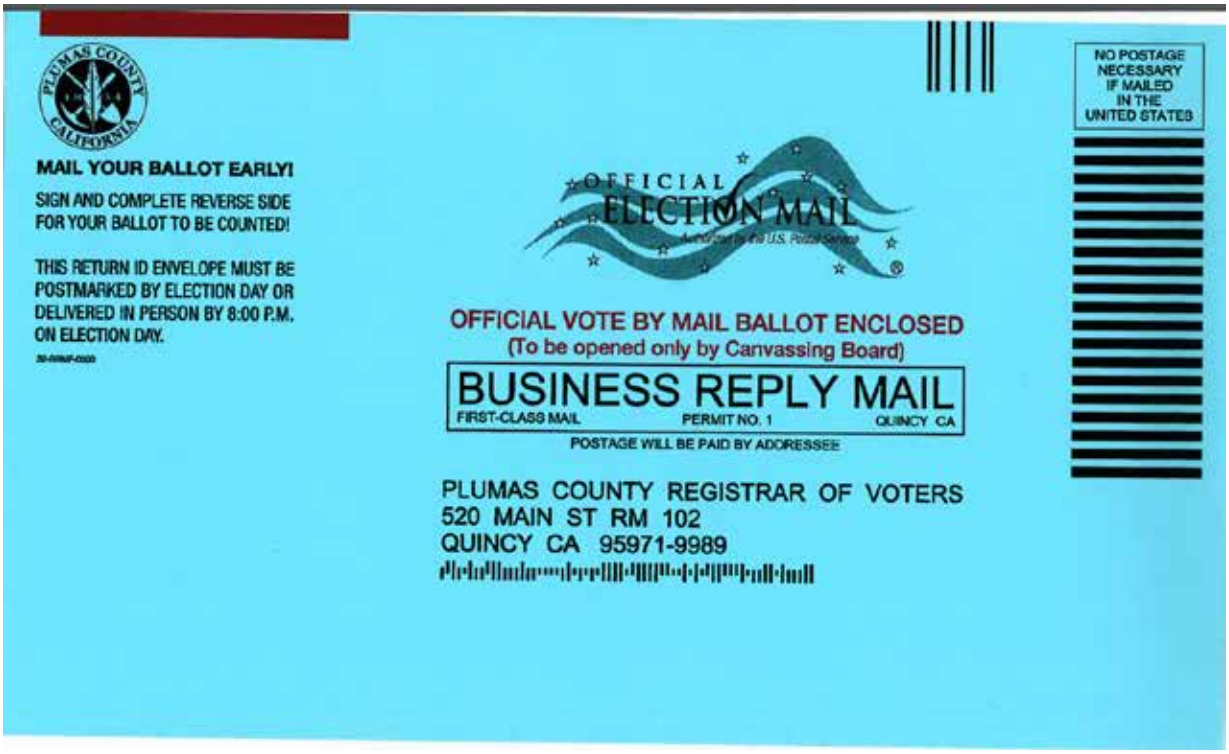
Voter's residence address and city (No PO Boxes or mailing addresses)
Domicilio del elector y ciudad (no se aceptan apartados postales o direcciones postales)

Witness Signature/Firma del Testigo _____
If voter is unable to sign due to illness or injury, s/he may make a mark witnessed by one person.
Si el elector no puede firmar debido a alguna lesión o enfermedad, él o ella puede estampar su marca ante la presencia de otra persona.

20-IDB-0320

MADERA COUNTY- RETURN 5.875" X 10" Black / 485 Red Proof #2

Plumas County



MAIL YOUR BALLOT EARLY!

SIGN AND COMPLETE REVERSE SIDE FOR YOUR BALLOT TO BE COUNTED!

THIS RETURN ID ENVELOPE MUST BE POSTMARKED BY ELECTION DAY OR DELIVERED IN PERSON BY 8:00 P.M. ON ELECTION DAY.

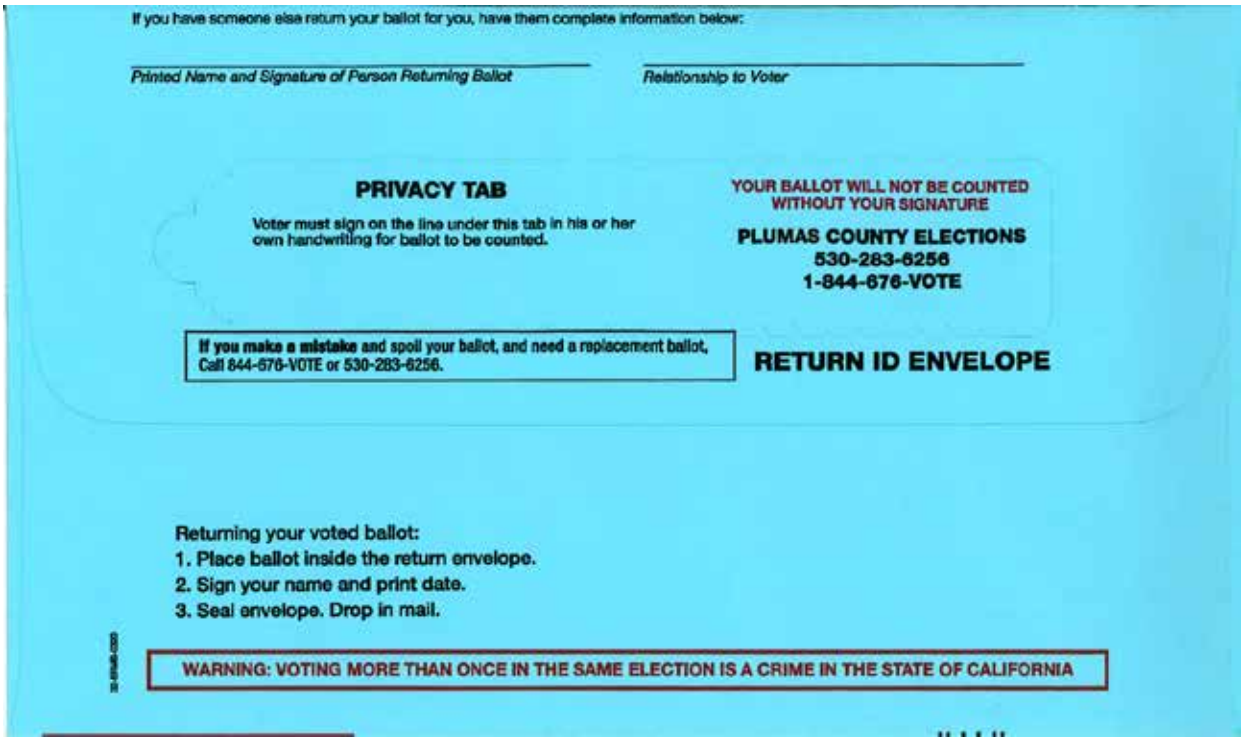
NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

OFFICIAL ELECTION MAIL

OFFICIAL VOTE BY MAIL BALLOT ENCLOSED
(To be opened only by Canvassing Board)

BUSINESS REPLY MAIL
FIRST-CLASS MAIL PERMIT NO. 1 QUINCY CA
POSTAGE WILL BE PAID BY ADDRESSEE

PLUMAS COUNTY REGISTRAR OF VOTERS
520 MAIN ST RM 102
QUINCY CA 95971-9989



If you have someone else return your ballot for you, have them complete information below:

Printed Name and Signature of Person Returning Ballot *Relationship to Voter*

PRIVACY TAB

Voter must sign on the line under this tab in his or her own handwriting for ballot to be counted.

YOUR BALLOT WILL NOT BE COUNTED WITHOUT YOUR SIGNATURE

PLUMAS COUNTY ELECTIONS
530-283-6256
1-844-676-VOTE

If you make a mistake and spoil your ballot, and need a replacement ballot, Call 844-676-VOTE or 530-283-6256.

RETURN ID ENVELOPE

Returning your voted ballot:
1. Place ballot inside the return envelope.
2. Sign your name and print date.
3. Seal envelope. Drop in mail.

WARNING: VOTING MORE THAN ONCE IN THE SAME ELECTION IS A CRIME IN THE STATE OF CALIFORNIA

I declare under penalty of perjury that I am a resident voter in Plumas County;
I am the person whose name appears on this envelope; I have not requested a ballot from any other county for this election.
YOU MUST SIGN YOUR OWN NAME ON THE LINE FOR YOUR BALLOT TO BE COUNTED.

SIGN HERE

DATE _____

Print Name

Plumas County Residence Address (DO NOT USE PO BOX)

City State Zip Code

Signature will be compared to your voter registration card.

Returning your voted ballot:
1. Place ballot inside the return envelope.
2. Sign your name and print date.
3. Seal envelope. Drop in mail.

WARNING: VOTING MORE THAN ONCE IN THE SAME ELECTION IS A CRIME IN THE STATE OF CALIFORNIA

Sacramento County

DECLARATION OF VOTER
I declare under penalty of perjury that: I am a resident of the precinct in Sacramento County, California from which I am voting; I am the person whose name appears on this envelope; I have not applied for and do not intend to apply for a vote by mail ballot from any other jurisdiction for this election.

You must sign in your own handwriting. Your signature must match the signature on your voter registration card. Voting twice in an election is a crime. Power of attorney is not acceptable.

Voter, sign and date below / Votante, firme y coloque la fecha abajo

X

Date / Fecha **(MM/DD/YYYY)** _____

Print name / Imprimir nombre _____

Print your voter registration address / Imprima tu dirección de registro de votante

_____

_____

If you are unable to sign, make your mark and have a witness sign below: / Si usted no puede firmar, haga una marca y haga que un testigo firme abajo.

Witness, sign here / Testigo, firme aquí _____

(916) 875-6451 www.elections.saccounty.net

DECLARACIÓN DEL VOTANTE
Yo declaro bajo pena de perjurio que: soy residente del recinto electoral en el Condado de Sacramento, California en el que estoy votando; soy la persona cuyo nombre consta en este sobre; no he solicitado, ni solicitaré una boleta de voto por correo para esta elección de ninguna otra jurisdicción.

Debe firmar de puño y letra. Su firma debe coincidir con la firma en la tarjeta de inscripción del votante. Votar dos veces en una elección es un crimen. No se aceptan poderes notariales.

I authorize the person below to return my ballot: / Autorizo a la persona abajo a devolver mi boleta:

Their name / Su nombre _____

Their signature / Su firma _____

Relationship to voter / Relación con el votante _____

NOTICE: Return your VOTE BY MAIL BALLOT to the Elections Office or authorized ballot drop off location for Sacramento County.
AVISO: Devuelva su BOLETA DE VOTO POR CORREO a la Oficina de Elecciones o una ubicación de entrega de boleta autorizada para el Condado de Sacramento.

DECLARATION OF VOTER
I declare under penalty of perjury that: I am a resident of the precinct in Sacramento County, California from which I am voting; I am the person whose name appears on this envelope; I have not applied for and do not intend to apply for a vote by mail ballot from any other jurisdiction for this election.

DECLARACIÓN DEL VOTANTE
Yo declaro bajo pena de perjurio que: soy residente del recinto electoral en el Condado de Sacramento, California en el que estoy votando; soy la persona cuyo nombre consta en este sobre; no he solicitado, ni solicitaré una boleta de voto por correo para esta elección de ninguna otra jurisdicción.

IMPORTANT: Voting more than once in one election is a crime.
IMPORTANTE: Es un delito votar más de una vez en una elección.

Your signature in your own handwriting is required below in order for your ballot to be counted.
Se requiere su firma de su propio puño y letra a continuación para que su boleta sea contada.
Power of attorney is not acceptable.
No se acepta poder notarial.

SIGN HERE
FIRME AQUÍ

Your Signature or Your Mark* / Su firma o Marca* — Date / Fecha

Residence Address / Residencial

City or Town, State, Zip Code / Ciudad o Pueblo, Estado, Código Postal

*If voter is unable to sign, he or she may make a mark which shall be witnessed by one person.
*Si el votante no fuera capaz de firmar, puede hacerlo con una marca en presencia de un testigo.

Witness to Signature of mark
Testigo de la veracidad del marca

Complete below only if someone else is returning your ballot for you.
Complete la información siguiente únicamente si otra persona esta entregando su boleta por usted.

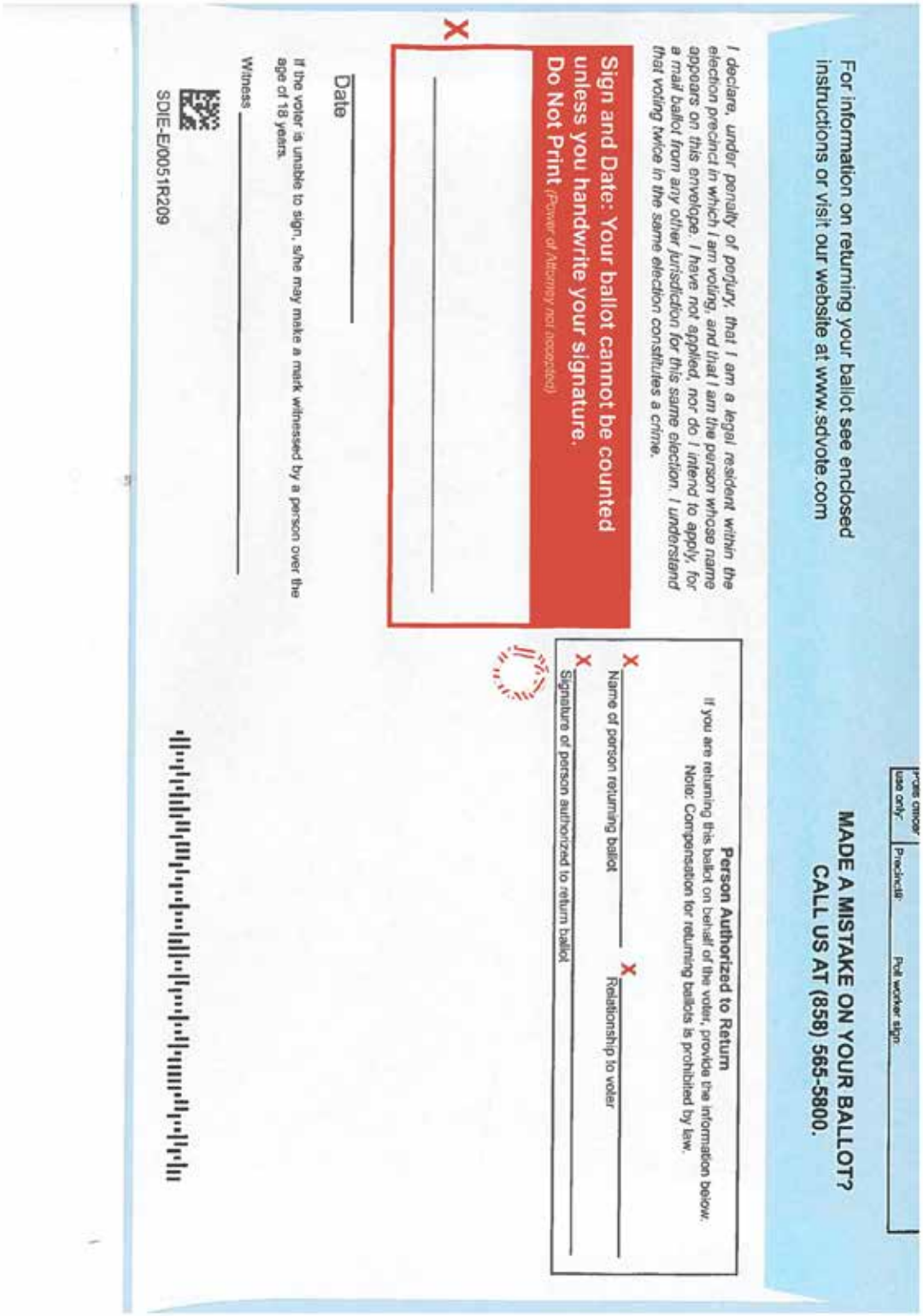
I authorize the following person **(Print Name):** _____ to return my ballot to the Election Official who issued the ballot, to the precinct board at a polling place or Vote Center or to a Vote By Mail Ballot Drop Box location within the state.

Yo autorizo a la siguiente persona **(Nombre en letra de molde):** _____ para devolver mi boleta al Funcionario de Elecciones que emitió la boleta, a la junta del recinto en un lugar de votación o al Centro de Votación o a una ubicación de buzón de entrega de boleta de voto por correo dentro del estado.

I am authorized to return this ballot. Estoy autorizado para entregar esta boleta

Signature of person returning ballot / Firma de la persona que entrega la boleta — Relationship / Relación

San Diego County



For information on returning your ballot see enclosed instructions or visit our website at www.sdvote.com

I declare, under penalty of perjury, that I am a legal resident within the election precinct in which I am voting, and that I am the person whose name appears on this envelope. I have not applied, nor do I intend to apply, for a mail ballot from any other jurisdiction for this same election. I understand that voting twice in the same election constitutes a crime.

Sign and Date: Your ballot cannot be counted unless you handwrite your signature.
Do Not Print *(Power of Attorney not accepted)*

X

Date

If the voter is unable to sign, s/he may make a mark witnessed by a person over the age of 18 years.

Witness

SDIE-E/0051R209

Polls office use only: Precinct#: Poll worker sign:

MADE A MISTAKE ON YOUR BALLOT?
CALL US AT (858) 565-5800.

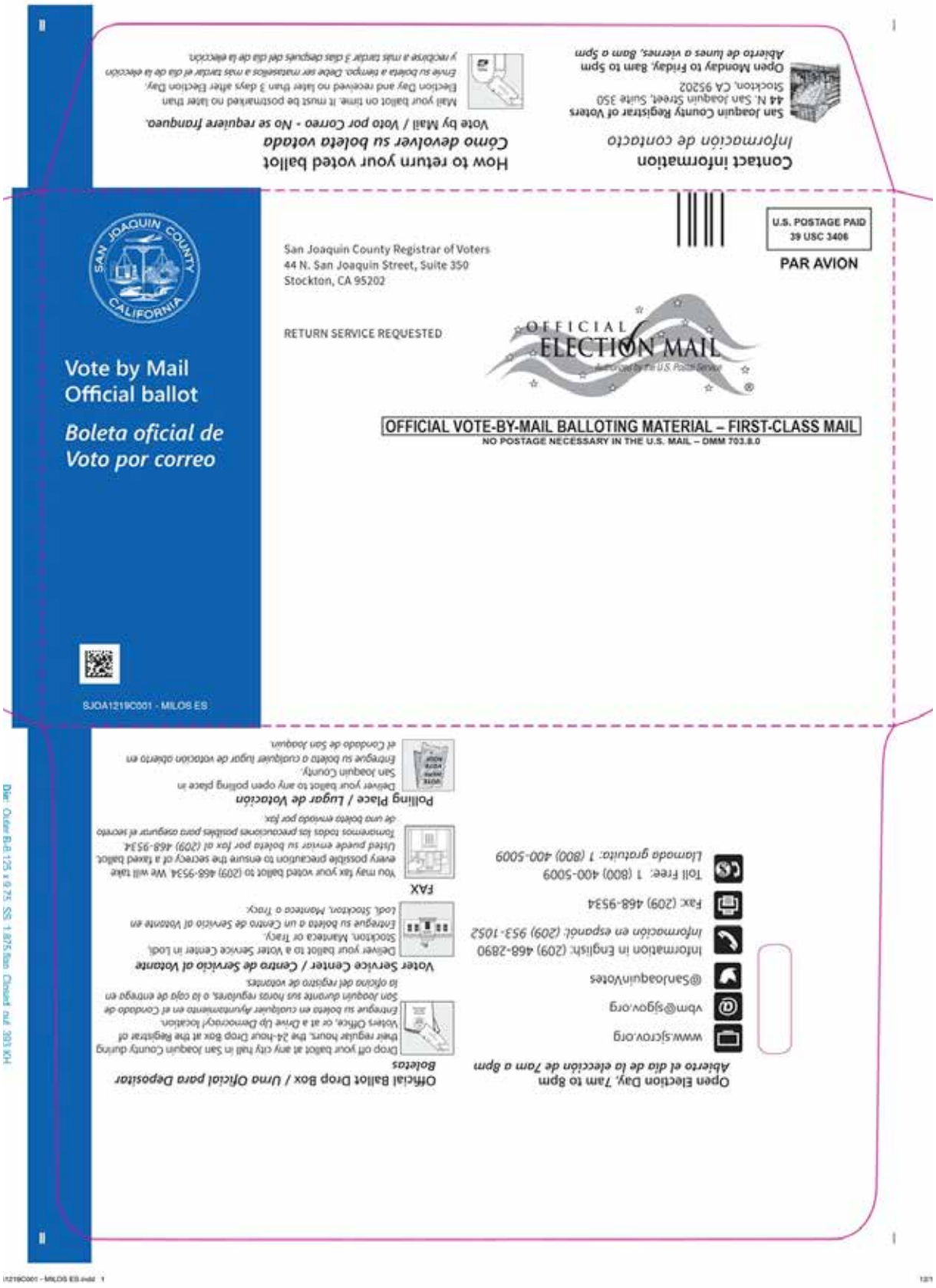
Person Authorized to Return

If you are returning this ballot on behalf of the voter, provide the information below.
Note: Compensation for returning ballots is prohibited by law.

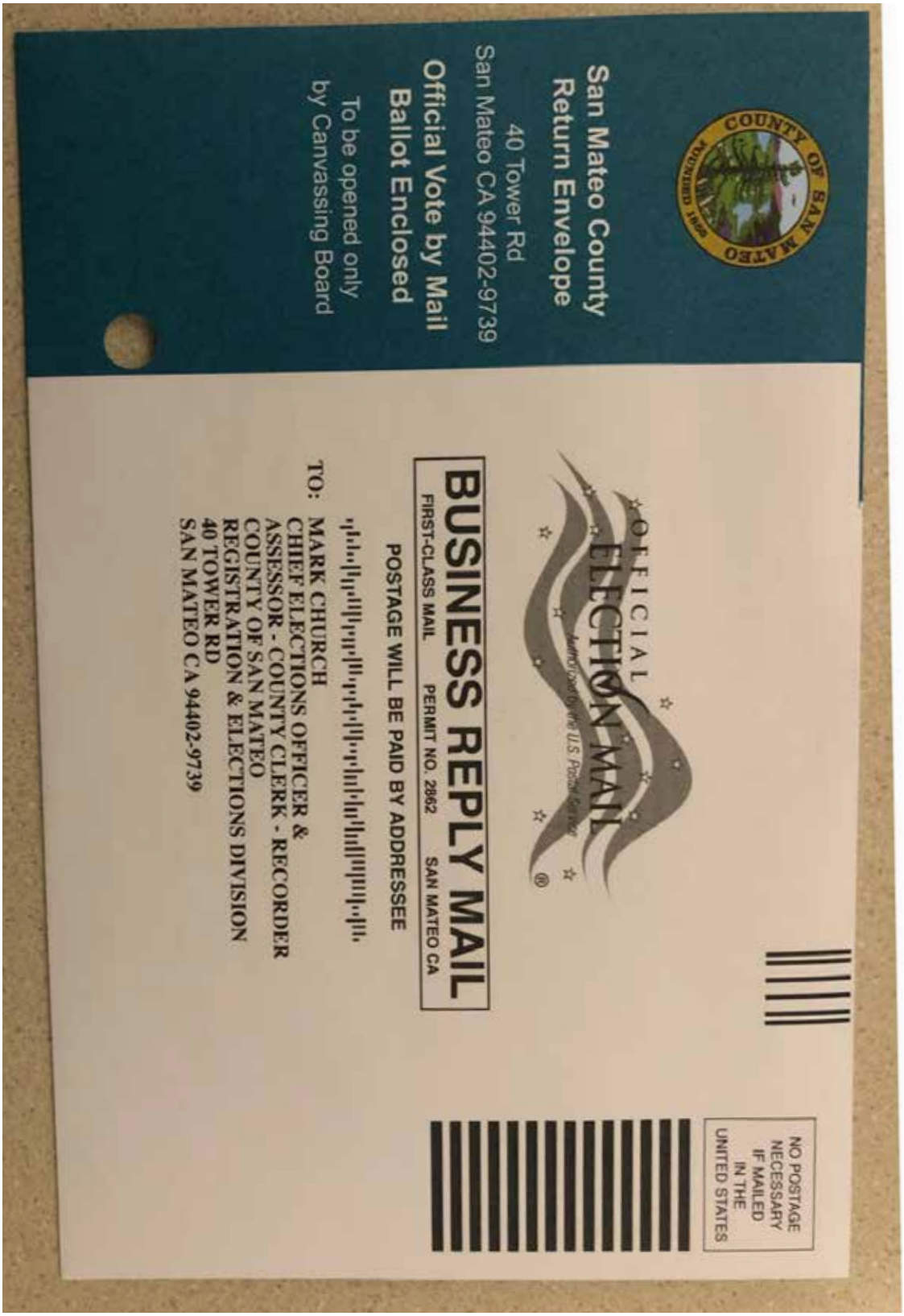
X Name of person returning ballot X Relationship to voter

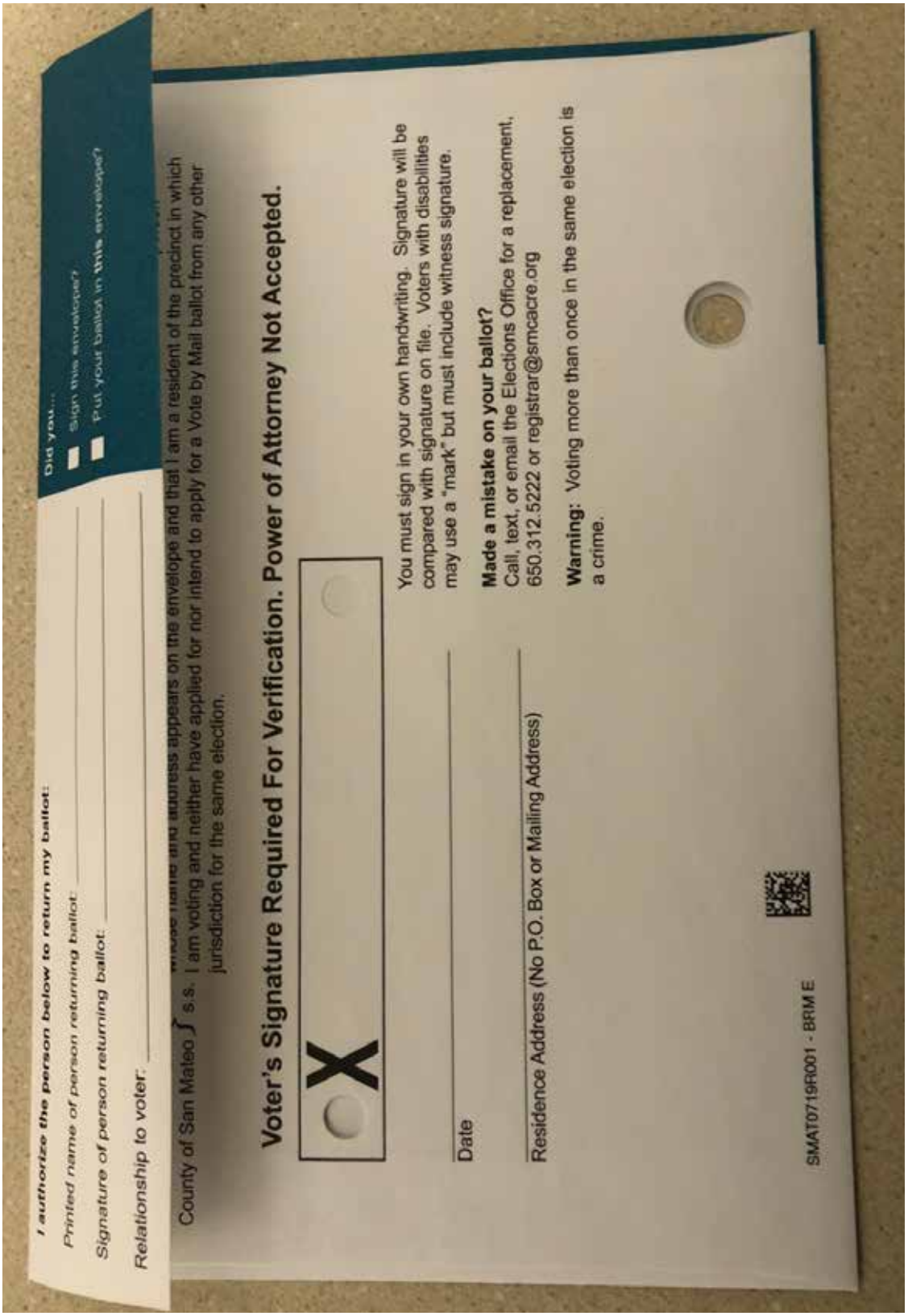
X Signature of person authorized to return ballot

San Joaquin County



San Mateo County





I authorize the person below to return my ballot:

Printed name of person returning ballot: _____

Signature of person returning ballot: _____

Relationship to voter: _____

Did you...

- Sign this envelope?
- Put your ballot in this envelope?

County of San Mateo ∫ s.s. Whose name and address appears on the envelope and that I am a resident of the precinct in which I am voting and neither have applied for nor intend to apply for a Vote by Mail ballot from any other jurisdiction for the same election.

Voter's Signature Required For Verification. Power of Attorney Not Accepted.

X

Date _____

Residence Address (No P.O. Box or Mailing Address) _____

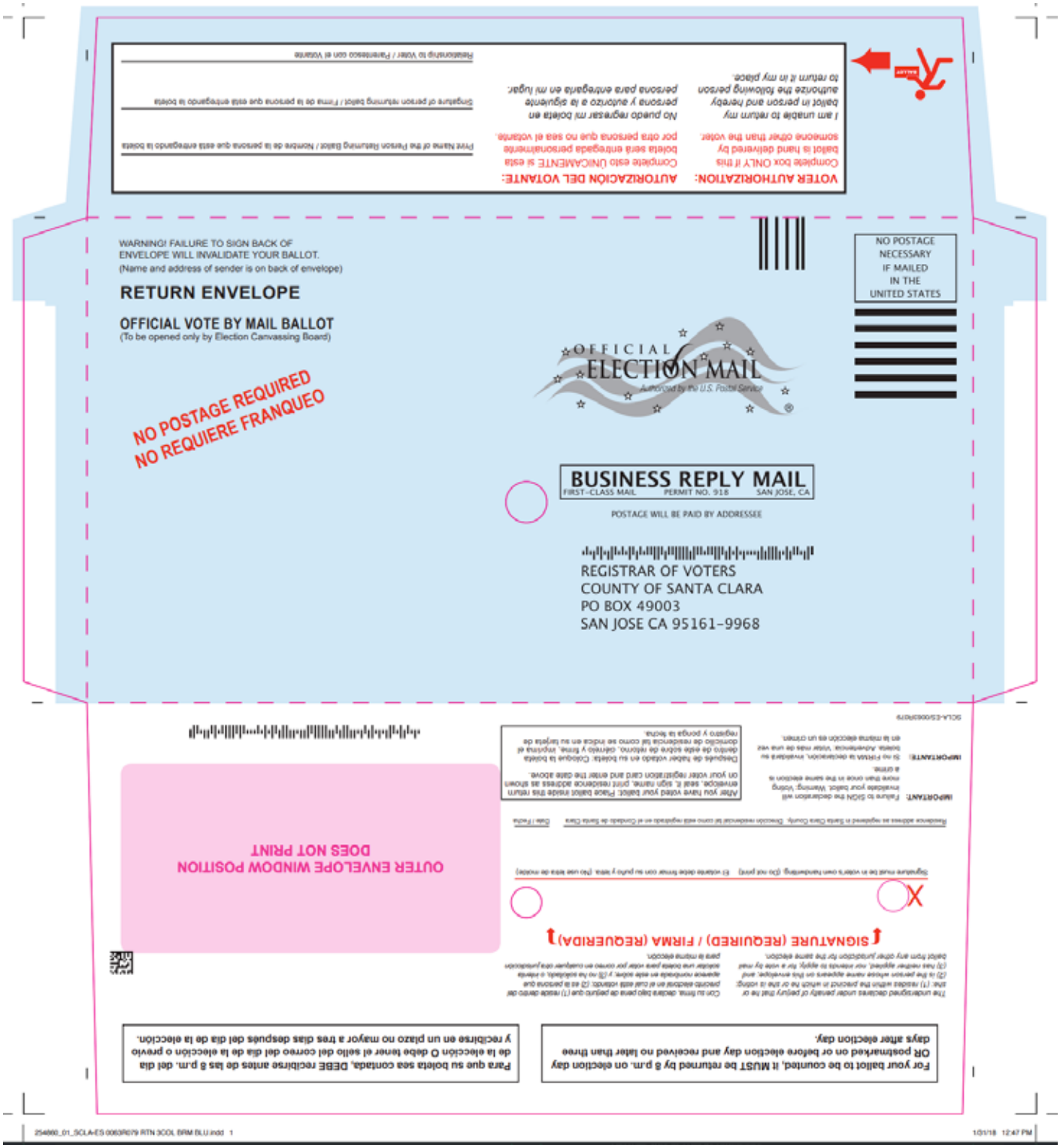
You must sign in your own handwriting. Signature will be compared with signature on file. Voters with disabilities may use a "mark" but must include witness signature.

Made a mistake on your ballot?
Call, text, or email the Elections Office for a replacement, 650.312.5222 or registrar@smcacre.org

Warning: Voting more than once in the same election is a crime.

SMAT0719R001 - BRM E

Santa Clara County



Santa Cruz County

This covers your signature. Did you sign the envelope?
Esto protege su firma. ¿Firmó el sobre?

CRUZ0120R001 - BRM ES

Return envelope
Official Ballot
To be opened only by Canvassing Board

Sobre de retorno
Boleta oficial
Para ser abierto unicamente por la Junta de Escrutinio

Drop off your ballot by 8pm on Election Day.
Mail your ballot so that it is postmarked by Election Day.

Entregue su boleta no mas tadar de las 8pm el Dia de la Elección.
Envie su boleta por correo para que tenga el sello postal no más tardar el Día de la Elección.

OFFICIAL ELECTION MAIL
Approved by the U.S. Postal Service

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL
FIRST-CLASS MAIL PERMIT NO. 309 SANTA CRUZ, CA

POSTAGE WILL BE PAID BY ADDRESSEE

SANTA CRUZ COUNTY CLERK-ELECTIONS
701 OCEAN ST RM 310
SANTA CRUZ CA 95060-9942

Did you sign below in your own handwriting?
¿Firmó abajo con su propia letra?

Made a mistake on your ballot?
Call the Elections office for a replacement
831-454-2060 or
vbm@votescount.com

¿Cometió un error en su boleta?
Llame a la oficina electoral para un reemplazo
831-454-2060 o
vbm@votescount.com

Voter's declaration. I declare that:
- I am a resident of and a voter in the county, and the person whose name appears on this envelope.
- I have not appliec, nor will I apply for a vote-by-mail ballot from any other jurisdiction in this election.
- I declare under penalty of perjury that this is true to the best of my knowledge and belief.

Declaración del votante. Yo declaro que:
- Soy residente y votante en el condado, y la persona cuyo nombre aparece en este sobre.
- No he solicitado, ni solicitare una boleta de voto por correo de otra jurisdicción en esta elección.
- Declaro bajo pena de perjurio que esto es verdadero a lo mejor de mi conocimiento y creencia.

Voter, sign here in ink.
Votante, firme aquí con tinta.

Power of attorney is not acceptable.
Un poder notarial no es aceptable.

X

Date / Fecha (MM/DD/YYYY) _____

If you are unable to sign, make your mark and have a witness sign below:
Si usted no puede firmar, haga una marca y que firme un testigo en la línea:

Witness, sign here / Testigo, firme aquí _____

I authorize the person below to return my ballot:
Autorizo a la persona abajo a devolver me boleta:

Their name
Su nombre _____

Their signature
Su firma _____

Relationship to voter
Relación a este votante _____

Your signature must compare with the signature on your voter registration card.
Voting more than once in an election is a crime.

Su firma debe coincidir con la firma en la tarjeta de inscripción del votante.
Votar más de una ves en una elección es un crimen.

Print name
Nombre en letra de molde _____

Print your voter registration address
Imprima su dirección de registro de votante

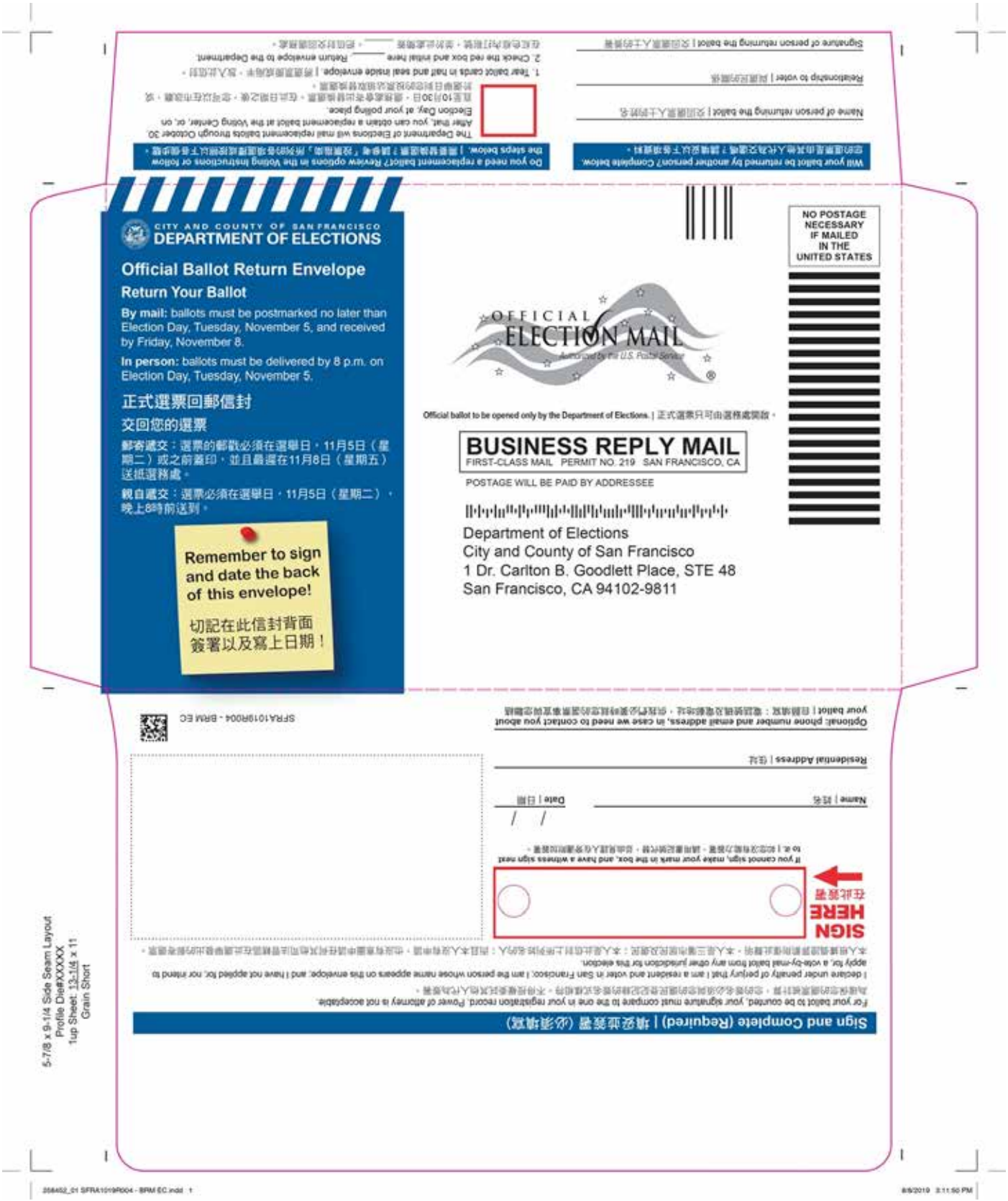
_____

_____

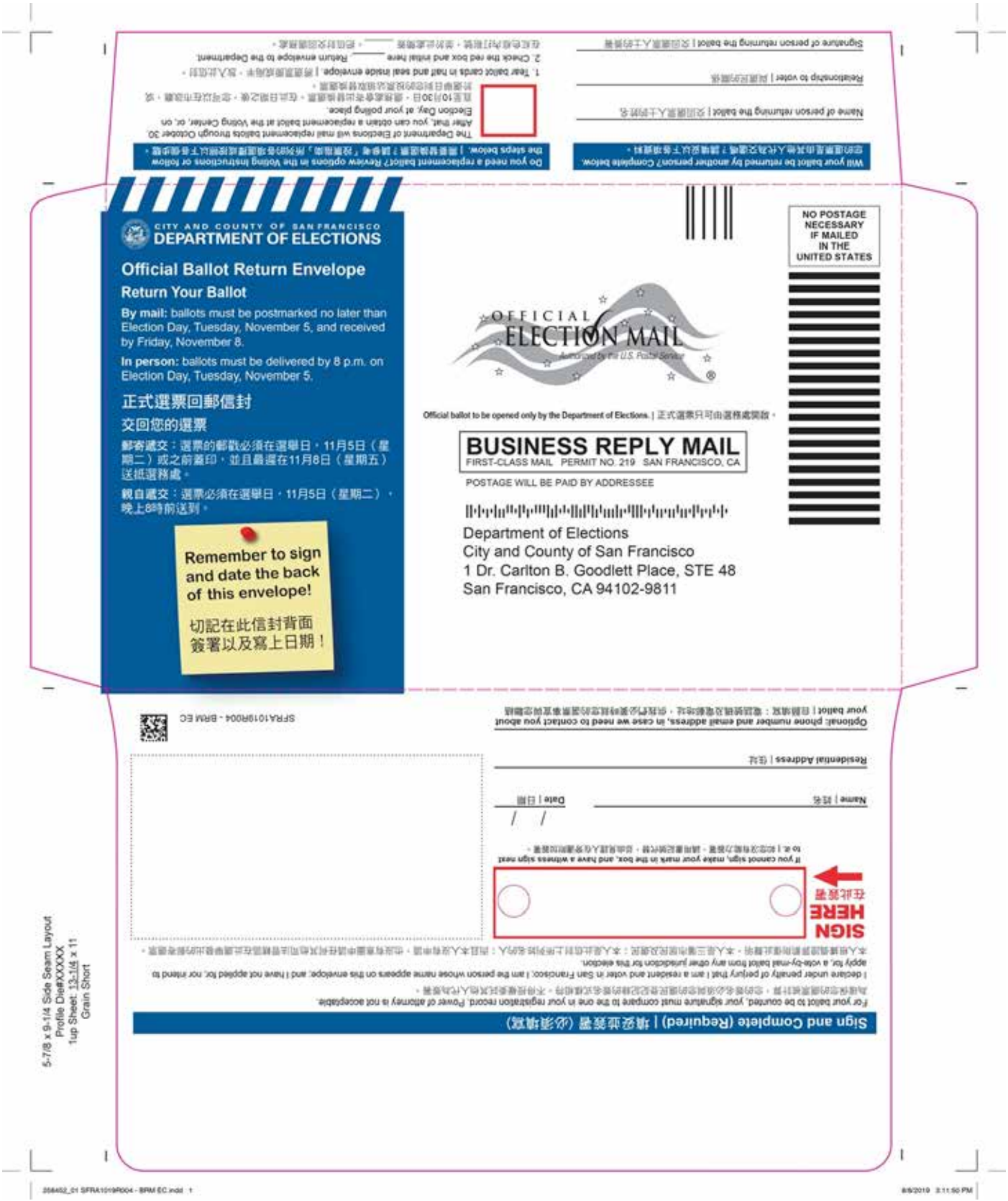
Your phone # or email
Su telefono o email: _____

259036_02_CRUZ0120R001 - BRM ES.indd 1 11/23/2019 4:01:33 PM

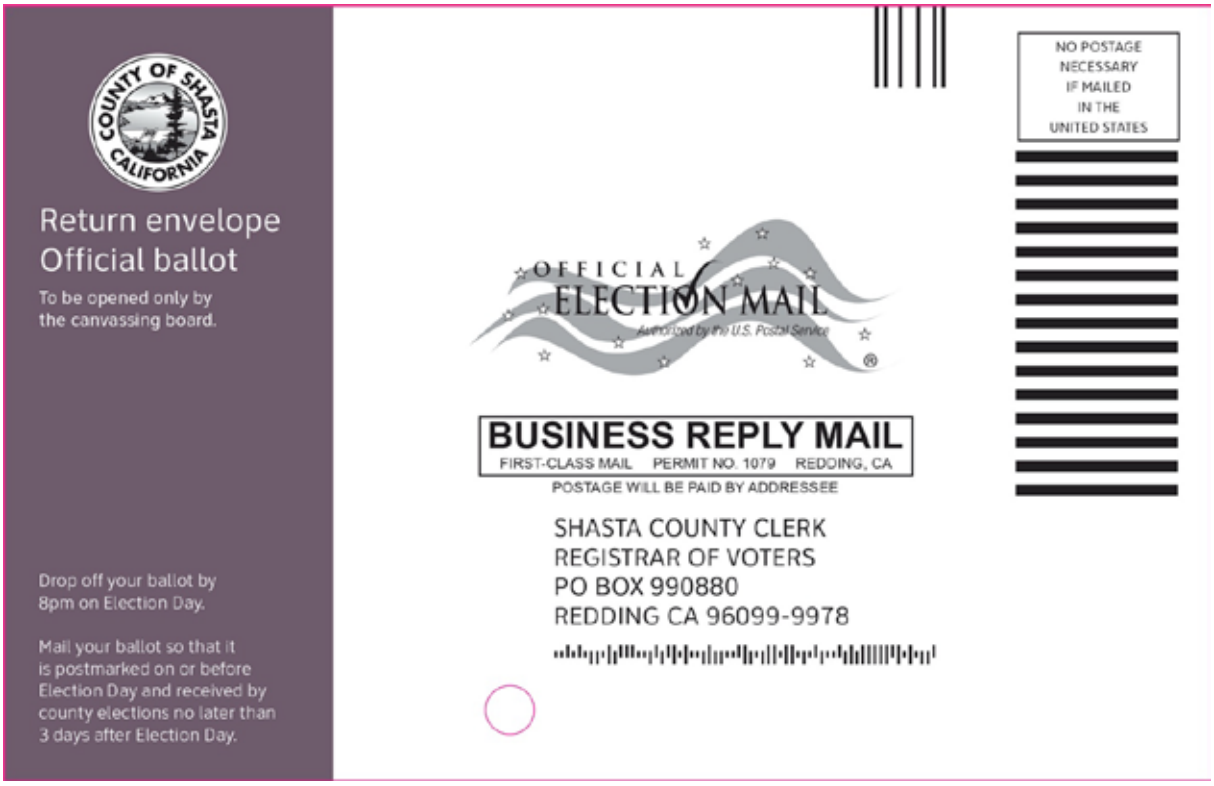
San Francisco County

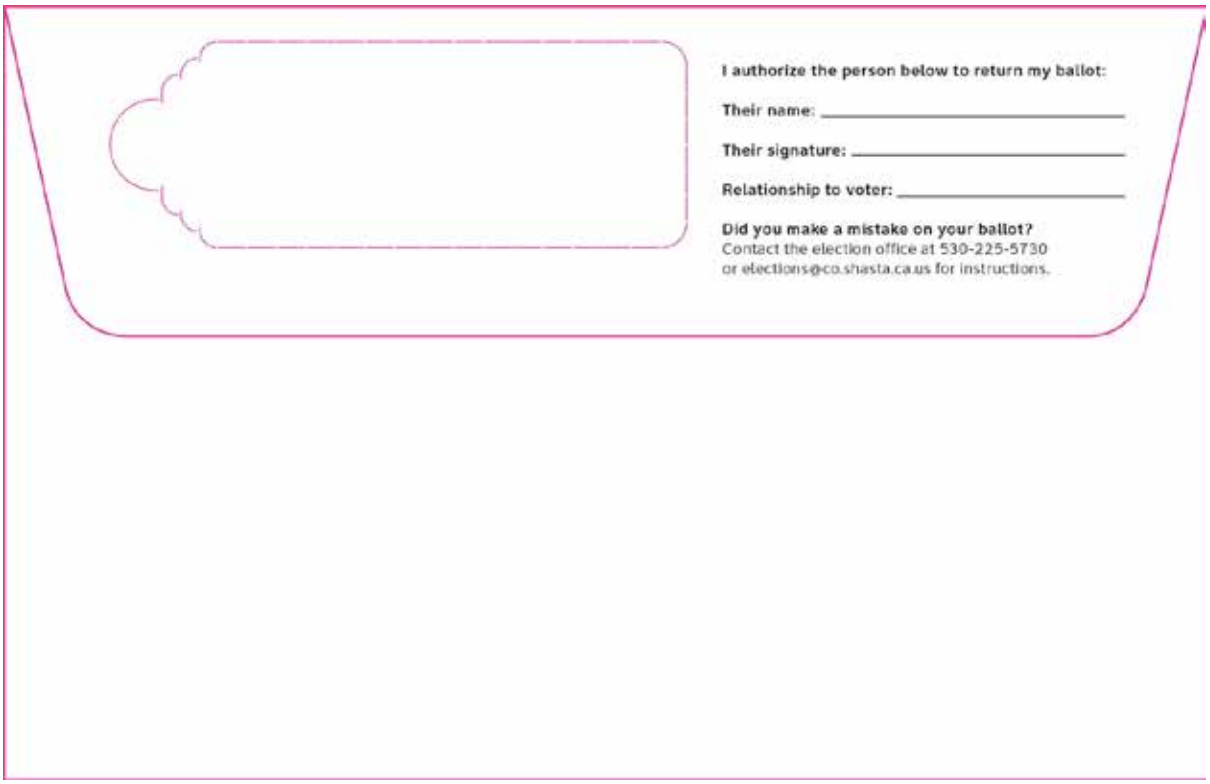


San Francisco County



Shasta County





Shasta County, continued

Voter: sign here Power of attorney is not acceptable.

X

Today's date: _____

Voter's declaration I declare that

- I am a resident of and a voter in the county, and the person whose name appears on this envelope.
- I have not applied, nor will I apply for a vote-by-mail ballot from any other jurisdiction in this election.
- I declare under penalty of perjury that this is true to the best of my knowledge and belief.

You must sign in your own handwriting. Your signature must match the signature on your voter registration card. Voting twice in an election is a crime.

Email or Phone (Optional)

Print name:

Print your voter registration address:

If you are unable to sign, make your mark and have a witness sign below:

Witness, sign here

Did you...

☐ Sign the voter's declaration in your own handwriting?

☐ Put your ballot in the envelope?

01/2019

Sonoma County

(0618) BRM

I declare under penalty of perjury that I am a resident of the Sonoma County precinct from which I am voting; I am the person whose name appears on this envelope; I have not applied for and do not intend to apply for a vote by mail ballot from any other jurisdiction for this election.

YOU MUST SIGN YOUR NAME BELOW FOR YOUR BALLOT TO BE COUNTED. SIGNATURE OF VOTER ONLY (OR MARK*)

X _____ DATE _____

Voter's Signature

_____ *Witness Signature: If voter is unable to sign due to illness or injury, he or she may make a mark witnessed by one person.

By law, the Voter's signature on this envelope must be verified against the signature on the voter's registration card.

Appendix III - Automated Processes Vendors List

County	Use of Automation	Vendor	Model
Amador County	manual		
Calaveras	manual		
Contra Costa	sorting		
Del Norte	non-verification		
El Dorado	verification	Runbeck	Agilis
Fresno	verification		
Humboldt County	non-verification	Fluence	Elevate
Imperial County	non-verification		
Kern County	non-verification		
Lassen County	manual		
Los Angeles County	verification	ES&S	Mail Ballot Verifier 1000
Madera	non-verification		
Marin County	verification	Bell & Howell	Circa 2013 - no model #
Merced County	verification	ES&S	Mail Ballot Verifier 1000
Modoc County	manual		
Monteray	verification		
Napa County	non-verification		
Orange County	non-verification		
Plumas County			
Riverside	verification	Bluecrest	Vantage
Riverside	verification	Pitney Bowes	Olympus
Sacramento	non-verification		
San Benito	non-verification		
San Diego	verification	Pitney Bowes	
San Francisco	non-verification		
San Joaquin			
San Luis Obispo County	non-verification		
San Mateo	non-verification	Pitney Bowes	Olympus
Santa Clara County			
Santa Cruz	non-verification		
Shasta County			
Solano County	non-verification		
Sonoma County	sorting machine	Bell & Howell	
Ventura County	verification		

Key

Manual = everything done manually

Non-verification = use automation for sorting / scanning / displaying signatures, but no verification purposes

Verification = use automation for verification purposes

Blank boxes = We could not obtain this information

Appendix IV - Regression Results

TABLE 3: Regression Results								
	Automation		No Review Automation		100% VBM		Levels of Review	
	Reject Rate	Mismatch Share	Reject Rate	Mismatch Percent	Reject Rate	Mismatch Percent	Reject Rate	Mismatch Percent
Percentage Point Change	0.00687 (0.00501)	0.0438 (0.0605)	0.0172** (0.00639)	0.0898 (0.104)	-0.0120*** (0.00325)	-0.0478 (0.0683)	-0.00549* (0.00245)	0.0175 (0.0387)
Number of Returned VBMs (Control)	-2.41e-08* (1.15e-08)	-7.02e-08 (7.25e-08)	-2.76e-08* (1.01e-08)	-7.65e-08 (7.60e-08)	-1.73e-08* (8.61e-09)	-5.65e-08 (5.42e-08)	-1.54e-08 (8.96e-09)	-5.68e-08 (5.04e-08)
Constant	0.0334*** (0.00670)	0.0680*** (0.0192)	0.0338*** (0.00683)	0.0689*** (0.0195)	0.0378*** (0.00706)	0.0550*** (0.0132)	0.0500*** (0.0100)	0.0113 (0.123)
County and Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.20	0.33	0.21	0.33	0.17	0.29	0.19	0.33
N	241	196	241	196	438	347	226	183

Parentheses denote standard error. ***=p<0.001, **=p<0.01, *=p<0.05.