

# **Alternative Voting Methods Report**

[Election Integrity Caucus of the Democratic Party of Oregon](#)

Presented by the *[Alternative Voting Methods Subcommittee](#)*, Chaired by **Lisa Wolf**

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## ELECTION INTEGRITY CAUCUS

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## **ALTERNATIVE VOTING METHODS - EXECUTIVE SUMMARY**

Voting science has advanced to allow voters to vote their conscience without sacrificing their vote for fear their vote will be wasted, which has been an inherent defect in traditional plurality-at-large voting methods. Careful study, coupled with contemporary statistical tools, have revealed substantial flaws in voting methods, which has motivated development of alternative voting methods to address those weaknesses. Therefore, the *Election Integrity Caucus* of the Democratic Party of Oregon (DPO) has deemed Alternative Voting Methods of utmost priority, and assigned a special committee to research the most promising methods.

Evaluation criteria were based on the study of leading voting science publications to identify the concepts and voting methods that represent the most common and best practices in this field. Commensurately, those criteria are reflected in the DPO Platform:

- Easy to Audit
- Decentralized Tabulation
- Simple to Administer
- Eliminate Vote Splitting/Spoiler Effect
- Assure a Winner with Majority Support
- Vote your Conscience/Reduce Strategic Voting
- Easy to Explain and Understand

The committee researched and compared these methods:

- [Plurality Voting](#)
- [Approval Voting](#)
- [Score Voting](#)
- [Ranked Choice Voting \(RCV\) a.k.a Instant Run-off Voting \(IRV\)](#)
- [STAR Voting - Score Then Automatic Runoff \(STAR\)](#)

Based on those comparisons, follow-up original research was conducted by the Multnomah County Democratic Party and the Democratic Party of Oregon that yielded detailed, real-world data to better understand and contrast implementation and pragmatic results of employing Plurality, Rank Choice Voting, [a.k.a. Instant Runoff (IRV)] and STAR Voting. Following the successful showing of STAR Voting in these pilot elections at the county and state level, the DPO and two county parties subsequently voted to adopt STAR Voting for use in various internal party elections, creating additional and unexpected case studies for further analysis.

### **RECOMMENDATION**

The committee has concluded that STAR Voting, overall, provides the most consistent best results of all studied alternative voting methods. Thus, we recommend adoption of STAR for all internal party elections as well as state and government elections as soon as possible. We also recommend additional well-funded independent research studies, sponsored by the state of Oregon and other voting science organizations, to further corroborate these findings and develop government implementation. Such research *must* assure objective, comprehensive consideration of all voting science criteria, and independence from influence by political parties and voting method advocates.

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# The Committee

The Alternative Voting [Subcommittee](#) of the Election Integrity Caucus was formed in May of 2019 to study alternatives to plurality voting for internal party elections. This Alternative Voting Methods Report and its conclusions are a result of that study. The committee researched the merits of each method and conducted test elections to compare different methods of the current voting method compared to the alternative voting methods that voting science recommends, focusing particularly on those with broad current or historical support in Oregon.

The project began with research surrounding voting reforms which are being advocated for in Oregon currently, notably Ranked Choice Voting and STAR Voting, though Approval voting and Score voting were also examined. The study took over 18 months, involved dozens of volunteers and thousands of hours to conduct.

## The Problem

Our current (choose-one only Plurality) voting method discourages participation among voters who consistently feel unrepresented by election results. Vote splitting and the spoiler effect, in particular, lead to unrepresentative outcomes (winners not supported by a majority of voters). Strategic voting, as voters feel unable to vote their conscience (vote honestly), accentuates the influence of money in politics and exacerbates political polarization. Many voters often feel their vote is wasted or even counter-productive.

While advocates from some alternative voting methods are prematurely rushing to quash consideration of other methods for government adoption, the Committee has sought to apply common criteria reflected in the platform of the Democratic Party of Oregon to all of the most common, widely supported voting methods currently being evaluated by election science.<sup>1</sup>

## The Mandate

The following planks from the Democratic Party of Oregon Platform, Article 5 (2018) helped form the mandate of the Committee [Emphasis added]

- **Plank 1:** We are committed to 100% *accuracy in all election tabulations and support full hand counts...*
- **Plank 7:** We support the right of political parties to nominate candidates by means of *instant-runoff voting... ensuring nominees are supported by a majority of electors.*
- **Plank 15:** We support the highest level of *security, accuracy, confidence & transparency* throughout the voting process and *clarity of instructions* in the voters' pamphlet.
- **Plank 29:** We support the enactment of *voting improvements that eliminate vote splitting* and more *accurately reflect the preferences and will of the voters.*

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<sup>1</sup> <http://electionscience.github.io/vse-sim/VSEbasic/>

# Criteria for Evaluation

There are several criteria called out in the Article 5 in the Platform of the Democratic Party of Oregon that form the basis for our evaluation of voting methods.

- **Easy to Audit** - *Plank 1*
- **Decentralized Tabulation** - *Plank 1*
- **Simple to Administer** - *Plank 15*
- **Easy to Explain & Understand** - *Plank 15*
- **Vote your Conscience/Reduce Strategic Voting** - *Plank 7 & 29*
- **Assure a Winner with Majority Support** - *Plank 7 & 29*
- **Eliminate Vote Splitting/Spoiler Effect** - *Plank 29*

## Voting Methods Studied

The committee studied several promising and popular voting methods, including two with significant support in Oregon. After considering Approval, Score, Ranked Choice, and STAR Voting, the committee focused on Ranked Choice [a.k.a. “Instant Runoff” (IRV)] and STAR Voting for further study and as the subject of voting trials for comparison with Plurality Voting. All five are discussed briefly below.

### Plurality Voting

Plurality Voting At-Large requires voters to select one candidate. The candidate with the most votes wins. Also called “first-past-the-post,” this voting method predates all modern democracies and is used predominantly throughout the United States today.

#### Pros:

- **Simplicity.** Tallying and determining the winner is reasonably straightforward.
- **Familiarity.** As the oldest voting method in use, voters are very familiar with it.
- **Precinct Summability.** Any subset of ballots can be independently tallied or audited and tabulation can occur locally before all ballots have been returned.

#### Cons:

- **Vote-splitting.** When voters must choose between similar candidates resulting in a vote-split, which results in a victory of a less favorable candidate who would not have otherwise won.<sup>2</sup>
- **Inexpressive.** Voters often feel compelled to NOT vote their preference, and instead strategically vote to stop the potential win of their opposition.
- **Polarizing.** Vote-splitting encourages candidates to try and set themselves apart from the competition by demonizing their competitors, relying on negative campaign tactics rather than positive issue oriented campaigns.

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<sup>2</sup> [https://www.starvoting.us/farewell\\_to\\_pass\\_fail](https://www.starvoting.us/farewell_to_pass_fail)

- Biased. Plurality voting gives a strong advantage to candidates who are seen as more electable or have more money, while putting voters who prefer multiple similar candidates on the ballot at a strong disadvantage due to vote splitting. Because it is common for multiple candidates to compete to represent the majority perspective, it's common for vote-splitting to favor the most polarizing candidates while disadvantaging those who are the most representative.

## Score Voting

Score Voting allows voters to score candidates on a scale of 1 to 3 (or more). The candidate with the highest cumulative score wins. Also known as “Range Voting.”

### Pros:

- Highly expressive. Allows voters to give a nuanced level of support for each candidate individually.
- Eliminates the spoiler effect. The ability to score each candidate individually eliminates vote splitting when voters are expressive.
- Reasonably simple. Ballots are tallied based on who has the highest sum score.
- Utilitarian. Elects consensus winners with strong and broad support delivering highly representative outcomes

### Cons:

- Susceptible to bullet voting, where voters opt to give candidates either top scores or zeros in order to protect their favorites from competitors.
- Not necessarily majoritarian.<sup>3</sup> Polarizing candidates with enthusiastic supporters can beat a candidate with broader, but less enthusiastic appeal.

## Approval Voting

Approval voting allows each voter to select any number of candidates. The candidate with the most votes wins.

### Pros:

- Simple to implement and understand.
- Since voters may vote for as many candidates as they want, approval voting eliminates vote splitting between similar candidates when voters are expressive.
- Approval voting promotes candidates with broad support, increasingly the possibility that a “consensus candidate” wins.

### Cons:

- Only mildly expressive. Voters may vote for multiple candidates, but voters cannot distinguish between different levels of support for various candidates.

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<sup>3</sup> Whether the majoritarian winner or the utilitarian winner is the “correct” winner is the subject of considerable philosophical debate, but as the platform is clear that the DPO is looking for majoritarian winners this is listed as a con.

- Can be susceptible to tactical voting. Voters have a strong strategic incentive to vote tactically by always approving the front-runner they prefer, even if they are not a candidate they would otherwise support.
- Favors incumbents and those who appear to be the most electable because failing to approve a candidate who is viable is in effect a wasted vote.

## Ranked Choice Voting (RCV) a.k.a “Instant Runoff Voting” (IRV)

RCV is a multi-phase voting method in which voters rank candidates in order of preference. The candidate who received the least 1st choice rankings is eliminated, and ballots which ranked the eliminated candidate 1st transfer to the next top ranked candidate. This continues in successive rounds, eliminating the candidate with the least top rankings, and transferring ballots when possible, until one candidate has a majority (50%+1) of ballots counted, at which point counting stops. Also known as “Instant-Runoff Voting” (IRV), advocacy for RCV has recently resurged, but the method has yet to catch on widely despite having been in use for over 100 years.<sup>4</sup> Ranked ballot systems were once used much more widely, but were repealed in many places with reasons cited including dissatisfaction with the winners and logistical problems related to implementation. Backlash against RCV may be due in part to the fact that it has been systematically oversold. Claims by advocates that it is safe to vote your conscience, that if your favorite is eliminated your next choice will be counted, and that it solves the spoiler effect are all demonstrably false.

### Pros:

- Has had broad support in the past among alternative voting advocates, and continues to have the most name recognition of any alternative voting method across the country.
- Reduces vote-splitting. Minority candidates are less likely to threaten the chances of a similar frontrunner, decreasing the possibility of a spoiled election, especially when potential “spoilers” have very little support.
- Majoritarian. The winner is more likely to be supported by broad coalitions of voters than in elections conducted under plurality voting.
- Fairly expressive. Voters can express preference order between candidates.

### Cons:

- Tallying ballots can be complex with multiple rounds. Tabulation requires keeping track of not only the number of rankings given for each candidate, but also the preference order on each specific ballot.
- Ballot “exhaustion” can occur, which is a process of elimination where votes are thrown out when the candidates ranked on a voter’s ballot, BEFORE their vote transfers. As a result, a voter’s down-ballot preferences may not be counted in subsequent rounds, even if their favorite is eliminated. This effect can lead to an

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<sup>4</sup> [https://www.rankedchoicevoting.org/history\\_rcv](https://www.rankedchoicevoting.org/history_rcv)



essentially spoiled election. Ballot exhaustion can lead to the *illusion* of a majority preferred winner, while actually electing a winner who was preferred on a majority of remaining ballots only.<sup>5</sup>

- Must be centrally tabulated because it relies on a process of elimination requiring examination of ALL ballots. Counting ballots cannot proceed beyond the first round until all ballots are centralized, and if additional ballots are discovered during the tabulation process, those ballots cannot simply be added to the count.
- Less accountability due to required centralized tabulation. RCV presents serious barriers to local oversight of elections, compromising checks and balances. Local elections officials are unable to generate the ballot sub-totals required for local audits. In contrast, all other voting methods considered here allow local tabulation (e.g, precinct-level tallies), which ensures that there can be checks and balances with a multitude of witnesses at each local tally and ease of audits at the local level.
- Lack of precinct summability results in compromised election security. Ballot centralization presents serious issues for election security due to the much more complex chain of custody, whether ballots are physically trucked to a central location or whether the cast vote record is sent electronically. Complexity in the many round tabulation process means that any errors or tampering which may occur are much harder to detect, and that less people overseeing the election would be able to identify an issue even if they were looking in the right place. The ranked ballot itself lacks resolution compared to rated ballots because voters cannot express equal levels of support for similar candidates, nor express different levels of support for candidates.
- Does not eliminate vote-splitting in elections with multiple-viable candidates.<sup>6</sup>
- Does not always elect a majority preferred winner and can fail to elect the candidate preferred over all others.
- Is difficult for voters when considering large numbers of candidates.

## STAR Voting - Score Then Automatic Runoff (STAR)

STAR voting is a two-phase voting method in which voters score as many candidates as they wish from zero up to five stars. Voters can assign candidates the same score if they do not have a significant preference between them. The two highest scoring candidates go to an instant runoff; the candidate preferred by more voters wins.

### Pros:

- Easily auditable
- Precinct Summable
- Eliminates Vote-Splitting

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<sup>5</sup> <https://electionscience.org/voting-methods/runoff-election-the-limits-of-ranked-choice-voting/>

<sup>6</sup> "monotonicity failures in three-candidate IRV elections may be much more prevalent than widely presumed (results suggest a lower bound estimate of 15 % for competitive elections)."  
<https://link.springer.com/article/10.1007/s11127-013-0118-2>

- Expressive (*Allows voters to express preferences for all candidates--ranging from no support to high support--while also allowing the same score for candidates if desired.*)
- Eliminates the need to bullet vote by ensuring that each voter's preferred finalist receives their full vote in the runoff.
- Ensures that of the two finalists, the winner is supported by the majority.
- Easy and familiar for voters to use, even with large numbers of candidates.

**Cons:**

- STAR Voting has limited real-world results data to study because to date it has only been used in a party and a statewide primary election.

## Comparison of Voting Methods based on Criteria

Criteria	Plurality	RCV	STAR
Easy to Audit	YES	No	YES
Decentralized Tabulation	YES	No	YES
Simple to Administer	YES	No	<i>Mostly</i>
Eliminates Vote Splitting	No	No	YES
Assures Majority Preferred Winner	No	<i>Mostly</i> <sup>7</sup>	YES
Vote your conscience	No	<i>Mostly</i>	YES
Easy to Explain & Understand	YES	Yes & No <sup>8</sup>	YES

<sup>7</sup> RCV assures a majority of votes *counted*, however not all votes are counted in the final deciding round

<sup>8</sup> While RCV can seem simple to comprehend, a fuller understanding often requires more in-depth study. For example, there is conflicting information regarding claims by RCV advocates that it eliminates vote splitting, however studies do not support that. It is true that RCV *reduces* vote splitting, however the potential for spoilers means that it is sometimes disadvantageous for voters to rank preferred candidates higher than candidates they like less. Ranking your favorite 1st can backfire and cause them to lose the election in some cases and may even create a counter-intuitive result where a voter gets a worse outcome than if they had not voted at all. See D R Woodall, "Monotonicity and Single-Seat Election Rules", Voting matters, Issue 6, 1996 (IRV referred to as Alternative Vote) and Alameda County election results for Oakland, CA Mayor, 2010: [https://www.acgov.org/rov/rcv/results2010-11-02/rcvresults\\_2984.htm](https://www.acgov.org/rov/rcv/results2010-11-02/rcvresults_2984.htm)

# **PILOTS - Voting Test Pilot and Manual Tabulation Pilot**

## **ALTERNATIVE VOTING TEST PILOT - Multnomah County**

On June 13, 2019, attendees at the Multnomah County Central Committee participated in a pilot project to compare 3 voting methods: “Choose-One” Plurality Voting (our current voting method), STAR Voting, and Ranked Choice Voting. All three ballots contained the same list of candidates; the candidates running in the 2020 presidential democratic primary.

Attendees were each given an envelope containing 3 ballots and a survey on which method they preferred. After a brief explanation and a summary of some of the pros and cons from advocates of both alternative voting methods, they were asked to vote.

### **Preliminary Findings**

In this scenario all three voting methods produced the same winner and the same top 3 candidates in the same order. 1st place: Elizabeth Warren, 2nd place: Bernie Sanders, and far below in 3rd place: Kamala Harris. What this tells us is that among voters polled there were only 2 truly viable candidates in the race. It’s interesting to note that both front-runners were strongly supported by each others’ voters. Sanders’ voters overwhelmingly scored and ranked Warren highly and vice versa. Though those two certainly split voters between them, there was no “spoiler” candidate strong enough to throw the election, and no other candidate strong enough to win, even with the majority divided between Sanders and Warren.

Looking further down the ballot was where some interesting differences were observed. Joe Biden tied for 5th place with 4% of the vote in Choose-One Plurality Voting, but did much worse in STAR Voting where he came in a distant 13th place with 109 stars and a 1.3 star average.

In contrast, Jay Inslee did much better in STAR Voting, coming in 4th place with a solid 217 stars, scoring close behind Kamala Harris. In Choose-One Plurality Voting, Inslee came in tied with Biden in 5th place with only 4% of the votes after Buttigieg, Harris, Sanders, and Warren.

For those curious why Inslee did much better in STAR Voting but worse in Choose-One Voting, and why the opposite was true for Biden, it’s possible that Biden may well have gotten a boost in Choose-One from voters assuming that he was a front-runner while Inslee likely was underestimated. One advantage of STAR Voting is that voters don’t have to worry about who is “viable” and vote strategically. They can safely score the candidates as they choose.

### **Tabulation<sup>9</sup>**

All three voting methods were tabulated by hand on June 15, 2019 by a team of trained volunteers at the MultCo Dems headquarters.

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<sup>9</sup> Pilot Videos: <https://www.youtube.com/watch?v=v5FP8Q24LgE>, [https://youtu.be/YpJP3R5\\_bbE](https://youtu.be/YpJP3R5_bbE), <https://youtu.be/8wjZb6oqac8>, <https://youtu.be/BzPpEz0wE3w>

**“Choose-One” Plurality Voting:** Ballots were sorted into piles for each candidate, and the piles were counted to determine the number of votes for each.

**Ranked Choice Voting:** Ballots were sorted into piles by 1st choice votes. The candidate with the least number of first place votes was eliminated, and those ballots were redistributed to those voters' next choice if possible. This process was continued through 9 rounds until Warren earned a majority of remaining ballots.

At a few stages in the elimination process there was more than one candidate tied for last place. A coin toss was performed (as is standard for official countywide elections) in order to determine who was eliminated first. There was discussion about whether it was better or more fair to eliminate both last place candidates at the same time, but as this had not been stipulated in advance it was determined to eliminate candidates one at a time.

In the elimination process there was also a ballot that was “exhausted”, meaning that specific ballot was unable to be transferred over to another pile after that voter’s candidate was eliminated. That ballot wasn’t counted in the final round where the winner was determined.

**STAR Voting:** Ballots were counted in two rounds. First, a scoring round to determine the total scores received by all voters for each candidate. Then an automatic runoff round between the two highest scoring candidates.

To tally the scores from all the ballots, one person was designated the caller and read the scores out-loud from the ballots. A group of volunteers recorded each score on tally sheets, 0-5, and when a number was called a tally was made on the corresponding sheet next to the candidate who received that score. Another person observed to ensure that the caller didn’t make any mistakes and also watched to make sure that the score was marked. Scores were then totaled by multiplying the score given by the number of tallies. The two highest scoring candidates were deemed finalists who then advanced to the automatic runoff.

For the automatic runoff the ballots were sorted into three piles: one for Bernie Sanders, one for Elizabeth Warren, and a “no-preference” pile for voters who had scored both finalists equally. Almost all voters who had scored both equally had given both finalists 5 stars. *This account has since been posted to the STAR Voting website.*<sup>10</sup>

## **Voting Method Preference**

After voting by all three methods, voters also completed a Voting Method Preference Survey to indicate the method they preferred. Over half the voters indicated they preferred using STAR:

STAR Voting: 39 (53%)

RCV: 17 (23%)

Plurality: 13 (17%)

No Preference: 5 (7%)

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<sup>10</sup> [https://www.starvoting.us/alternative\\_voting\\_method\\_pilot](https://www.starvoting.us/alternative_voting_method_pilot)

# MULTI-WINNER STAR VOTING TEST PILOT - DPO

## Automated Ballot Counting & Tabulation with Large Field of Candidates

In September of 2019, the Democratic Party of Oregon asked the Election Integrity Caucus and STAR Voting team to put together a pilot on Multi-Winner Bloc STAR Voting with automated ballot scanning and tabulation. Conducting elections for delegates to the Democratic National Convention has historically been a lengthy, cumbersome process involving many rounds of voting in order to meet criteria set by the Democratic National Committee that requires that winners be gender-balanced and that elections fairly represent non-binary candidates. In addition to those criteria, the Democratic Party of Oregon added half a dozen additional criteria in its search for an ideal voting solution.

The parameters for the test were designed to approximate a worst case scenario stress test for the upcoming Presidential Delegate Selection Elections, and a number of parameters were set by DPO Staff, led by Candy Emmons. Bloc STAR Voting would need to be able to pass all test parameters in order to prove itself a viable option for the upcoming election.

### Criteria set by DPO Staff:

- The voting method had to use a single ballot only. Voters would only need to vote once.
- Candidates would be able to designate themselves as "Male," "Female," or "Non-Binary," and all three types of candidates would be listed on the same ballot.
- The ballot would include a massive number of candidates. Up to 70 or more on a page.
- Tabulation could not exceed 3 hours, including counting ballots and tabulating winners.
- The voting method must be able to produce an ordered "preliminary winner list" which could then be used to produce a final set of gender-balanced winners who would actually be elected. On the preliminary winner list candidates would be ranked 1st place, 2nd place, 3rd place, and so on.
- The preliminary winner list would need to be able to be gender balanced such that an even number of male and female winners could be chosen while also electing all non-binary candidates who received sufficient votes to merit a seat.
- Must produce majority preferred winners.

### Added criteria set by DPO's Election Integrity Caucus, led by Chair Sherry Healy

- Compatible with risk limiting audits
- Only open sourced and verifiable code used by any software or hardware employed in the counting and tabulation
- Hand counting possible for a full recount if needed
- Decentralized tabulation possible
- No vote-splitting
- No wasted votes

## Pilot Context:

In advance of the pilot, the DPO Staff had already concluded that none of the voting methods they had previously considered could accomplish all their criteria on a single ballot without violating the election criteria spelled out in the platform, including Ranked Choice Voting, STAR Voting had not been considered. Advocates from the Equal Vote Coalition, including Sara Wolk and Mark Frouhnmayr, were confident that STAR Voting could pass the test and contacted Candy Emmons and Sherry Healy to let them know the option was available. For this reason the DPO pilot only included STAR Voting.

## Voting methods which weren't included in the pilot and why:

- **Ranked Choice Voting** - Doesn't eliminate vote splitting. For this reason RCV would be unlikely to yield representative results with the massive candidate field expected in the Delegate elections.
- **Score Voting** - Doesn't ensure majority preferred winners as mandated in the DPO bylaws.
- **Approval Voting** - Doesn't ensure majority preferred winners as mandated in the DPO bylaws.
- **Choose-One Plurality Voting** - Doesn't ensure majority preferred winners as mandated in the DPO bylaws. Doesn't eliminate vote splitting.
- **Choose-One Majority Voting** - Requires multiple rounds of balloting. Doesn't eliminate vote splitting.

***STAR Voting was found to be the ONLY voting method that met the party's complex needs without compromising on any of these criteria.*** In this case, the Party chose to use a modified version of multi-winner Bloc STAR Voting to accommodate gender balancing requirements. The result would be a ranking of all candidates from most to least supported, with this list then used to elect a balanced number of male, female and non-binary candidates.

## The Pilot

On September 7th, 2019, as a test run for implementing STAR Voting for the Democratic Party of Oregon's presidential delegate elections, the Alternative Voting Subcommittee of the DPO Election Integrity Caucus put on a pilot and demonstration for the DPO officers and Staff, including DPO Chair, Carla Hansen, DPO Chief of Staff Candy Emmons, Multnomah County Vice-Chair Michael Smith, Election Integrity Caucus Chair Sherry Healy, Alternative Voting Methods Workgroup Chair Lisa Wolf, Committee members and volunteers including Gary Litke, James Davis, and others.

Thousands of paper ballots were printed and randomly filled out by hand by both DPO and EI Caucus volunteers. Those ballots were then run through a normal scanner and processed with Remark software from Gravic.<sup>11</sup> Remark, designed for surveys, takes the scanned ballots, records the results, and flags all ballot sections which should be reviewed by a human eye. The software is simple to use and provides all the bells and whistles of an official election vendor. Remark was selected as one of a few survey software options considered which was open sourced, and met all of the election integrity criteria of the Election Integrity Caucus.

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<sup>11</sup> Videos from DPO pilot here: <https://youtu.be/hLww7D9XJgs> and <https://youtu.be/J3NrUDiFGkA>

From scanning to final results the process took 1.5 hours for an election with thousands of ballots. The raw ballot data collected was then run through a [STAR Elections google sheet](#)<sup>12</sup> programmed to tally the election results according to STAR Voting's Score Then Automatic Runoff process. The google sheet is open source.

### **Conclusion:**

The pilot was a success and STAR Voting was proposed for the Delegate Selection Elections at the next meeting of the State Central Committee of the Democratic Party of Oregon (see below).

## **Resolutions & Standing Rules Adopting STAR Voting**

Committee findings have led to the party adopting STAR Voting in several cases...

### **Multnomah County Adopts STAR Voting for Internal Elections**

In June of 2019, following the Multnomah County voting methods pilot experience, the Central Committee of the Multnomah County Democratic Party passed a standing rule to adopt STAR Voting for all internal elections. The rule came to the floor following a 2018 presentation on STAR Voting from PCP Sara Wolk, and the Committee presentations on STAR Voting and Ranked Choice Voting and demo election using ballots for both. The standing rule came to the floor with a "do pass" recommendation from the Rules committee. Rules Committee Chairs Michael Burleson and Multnomah County Democrats Vice-Chair Michael Smith both spoke in favor. The motion was carried by a super-majority vote. This Standing Rule can be found in Appendix C. The Multnomah County Democratic Party has been using STAR Voting for all internal elections with over two candidates since that time, and will be using STAR in the January, 2021 county Organizing Meeting to elect officers and delegates.

### **Democratic Party of Oregon Adopts STAR Voting for Delegate Selection Process**

On November 17th, 2019, at the State Central Committee (SCC) meeting of the Democratic Party of Oregon following the DPO delegate election pilot, Executive Director Brad Martin spoke at length in favor of adopting STAR Voting and detailed the pilot and other vetting which had been done by the DPO staff. DNC Delegate Travis Nelson, and Multnomah County Democrats Vice-Chair Michael Smith, both came to the mic and spoke in favor of the motion to adopt. The members of the SCC unanimously voted to adopt STAR Voting for the Delegate Selection Elections. The election itself was a huge success for the DPO and presents another case study for the successful use of STAR for a party election.<sup>13</sup>

### **Deschutes County Adopts STAR Voting for Candidate Endorsements**

In December of 2020, following multiple successful case studies<sup>14</sup> and a November 12th, 2020 presentation from the Deschutes County Voting Methods Workgroup and which recommended STAR Voting, the Deschutes County Democrats Central Committee passed a resolution to use STAR Voting in their endorsement elections. This resolution can be found in Appendix D.

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<sup>12</sup> [https://www.starvoting.us/star\\_with\\_google\\_sheets](https://www.starvoting.us/star_with_google_sheets)

<sup>13</sup> [https://www.starvoting.us/paper\\_ballots](https://www.starvoting.us/paper_ballots)

<sup>14</sup> [https://www.starvoting.us/case\\_studies](https://www.starvoting.us/case_studies)

## Conclusion & Recommendations

While no voting method is perfect, it was determined that for single-winner and gender balanced multi-winner bloc elections<sup>15</sup>, STAR Voting is the best fit.<sup>16</sup> STAR is highly expressive, capturing an accurate level of support for each candidate; it is reasonably simple to tabulate results; and it is incredibly effective at eliminating spoilers. Therefore, the Alternative Voting Methods Committee recommends the passage and use of STAR Voting for internal party elections. With the acceptance of this report by the DPO Election Integrity Caucus, the caucus hereby recommends the use of STAR Voting for all future internal party elections at both the local (county and congressional district committees) and state level. A resolution in support of adopting STAR Voting for governmental elections and which would adopt STAR Voting for DPO internal elections can be found in Appendix A and has been submitted to the Democratic Party of Oregon for consideration.

Furthermore, the Committee understands that voting reform is gaining momentum across Oregon and the United States, as reflected in our Party platform. In the interest of moving toward **a voting system where voters can truly vote their conscience while maintaining the highest levels of auditability**, the Committee recommends that the state and municipal governments within Oregon move to adopt an auditable, instant-runoff preference voting method that can be locally tabulated, truly eliminates vote-splitting and assures winners are preferred by a majority of all vote cast. The only voting method that meets all these criteria with demonstrated success in real-world use is STAR Voting.<sup>17</sup> **For that reason, the Committee recommends that the Democratic Party of Oregon prioritize passage of STAR Voting for local and statewide elections in Oregon.**

The Committee also recognizes that adopting a single alternative voting method to replace or augment Plurality voting, is a lifetime, consequential decision. We are proud to open this door of consideration with objective, thorough research. We also highly recommend that the state of Oregon and leading organizations in voting science who are looked to for leadership and expertise on this matter create forthwith, independent research studies to corroborate these findings and develop plans for governmental implementation of STAR Voting as soon as possible. These research studies *must* receive substantial funding to succeed and assure objectivity, comprehensive consideration of all voting science criteria, and independence from influence by any political party or school of alternative voting method.

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<sup>15</sup> [https://www.starvoting.us/multi\\_winner](https://www.starvoting.us/multi_winner)

<sup>16</sup> It should be noted that there is also a PR version of STAR; See <https://www.starvoting.us/pr>.

<sup>17</sup> On May 19th, 2020, the Independent Party of Oregon (IPO) used STAR Voting in its statewide online primary election to determine IPO candidates. They allowed all major party candidates to be on their ballot, which produced informative results for evaluating the effectiveness of STAR Voting in a real-world application. See [https://www.starvoting.us/ipo\\_primary\\_5\\_19\\_20](https://www.starvoting.us/ipo_primary_5_19_20), <https://medium.com/@5starvoting/independent-party-of-oregon-star-voting-primary-spotlight-on-the-data-1ab98d6fa8f4> and <https://medium.com/@5starvoting/ipo-presidential-primary-60347660bdd>



## Bibliography

- Wikipedia [STAR Voting](#) and [IRV](#) are good articles with many sources linked and cited.
- [Case Studies](#) for STAR are here including the MultDems Pilot and a Walk Through of the Presidential Delegate Selection.
- "[How Ranked-Choice Voting elects extremists](#)" Psephomancy, June 10, 2019
- "[Multi-dimensional Spatial Voting Simulations](#)" John Huang, 25 May 2020
- "[Leading Voting Methods: Pros and Cons](#)" and "[Comparing Voting Methods: A Report Card](#)" were both written by a committee tasked with the same job for RCV-OR.
- "[Voter Satisfaction Efficiency: Simulations comparing FPTP, IRV and STAR with different numbers of candidates](#)" Jameson Quinn
- [2020 Vision: Could STAR Voting slay the "electability" dragon?](#)
- [Nate Silver on the impacts of "Electability"](#): "Is Electability A Self-Fulfilling Prophecy?"
- STAR Voting Articles: <https://www.starvoting.us/articles>

# Appendix A

## Resolution in support of Adopting STAR Voting

**Whereas**, STAR voting is a user friendly voting method which better represents the will of the people. Voters score candidates from 0 up to 5 stars, according to preference and intensity of support, rather than being limited to only choosing a single candidate.<sup>18</sup> The two highest scoring candidates are finalists and the finalist preferred on more ballots wins; and

**Whereas**, STAR Voting eliminates vote splitting and the spoiler effect<sup>19</sup>, and has been found by experts<sup>20</sup> in the field to be best in class in terms of maximizing representative and accurate outcomes for voters, while incentivising honest voting, even compared to other alternative voting methods like Ranked Choice voting which only mitigate these problems<sup>21</sup>; and

**Whereas**, STAR Voting can be hand counted or automatically tabulated with simple open-source software. STAR Voting meets all Election Integrity best practices such as precinct summability<sup>22</sup>, **which ensures that it is compatible with risk-limiting audits and other recommended election security protocols.**

**Whereas**, STAR voting is highly accurate<sup>23</sup> with multiple candidates in the race, which in non-partisan elections eliminates the need for traditional runoffs, saving voters, candidates and governments time and money, while ensuring more representative results by deciding elections in the general election, when voter turnout is at its highest<sup>24</sup>; and

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<sup>18</sup> <http://equal.vote>

<sup>19</sup> “Cardinal voting methods are immune to vote splitting, since each candidate is rated independently of each other.” Poundstone, William. (2013). *Gaming the vote : why elections aren't fair (and what we can do about it)*.

<sup>20</sup> “STAR is undeniably a top-shelf election method, and arguably the best out of all the ones I tested.” -Jameson Quinn, PhD in Statistics, Harvard.

<sup>21</sup> [Ending The Hidden Unfairness In U.S. Elections](#) explains why plurality and runoff voting methods are vulnerable to vote splitting.

<sup>22</sup> [https://electowiki.org/wiki/Summability\\_criterion](https://electowiki.org/wiki/Summability_criterion)

<sup>23</sup> <http://electionscience.github.io/vse-sim/VSE/>

<sup>24</sup> “Primary elections routinely see lower and even less representative turnout than general elections.” [https://ssir.org/articles/entry/increasing\\_voter\\_turnout\\_what\\_if\\_anything\\_can\\_be\\_done](https://ssir.org/articles/entry/increasing_voter_turnout_what_if_anything_can_be_done)

**Whereas**, STAR voting helps ensure that candidates elected to office are preferred by a majority of voters<sup>25</sup>, that no votes are wasted, and that minority voters have a meaningful voice in elections, even when their favorites cannot win; and

**Whereas**, STAR Voting, like all preference voting methods, encourages coalition building and outreach beyond a candidate’s core base, and thus incentivises positive campaigning while discouraging attack ads<sup>26</sup>; and

**Whereas**, STAR Voting is a hybrid of Ranked Choice and Score Voting which maximizes the benefits of both while addressing legitimate criticisms. STAR Voting improves on Ranked Choice by eliminating spoilers and exhausted ballots, and by counting all ballot data. STAR improves on Score Voting by ensuring majority preferred winners when possible. STAR Voting improves on both with higher strategic voting resiliency and more representative outcomes than either; and

**Whereas**, STAR Voting can be used for single or multi-winner elections and can be adapted for proportional representation; and

**Whereas**, The DPO recently used multi-winner gender balanced STAR Voting for the election of Oregon’s presidential delegates and found that STAR voting is the only method which allows us to elect a non-binary inclusive gender-balanced list of majority preferred candidates as required by DNC, and DPO rules, without requiring voters to cast multiple ballots<sup>27</sup>; and

**Whereas**, Article 5 plank 29 of our party’s current Platform states, “We support the enactment of voting improvements that eliminate vote splitting and more accurately reflect the preferences and will of the voters.” now

**Therefore, the Democratic Party of Oregon resolves as follows:**

**Section 1:** We support efforts to adopt STAR voting at the local, statewide, and federal levels.

**Section 2:** We will use single-winner and multi-winner STAR Voting for internal elections for the Democratic Party of Oregon.

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<sup>25</sup> [https://electowiki.org/wiki/STAR\\_voting](https://electowiki.org/wiki/STAR_voting)

<sup>26</sup> <https://fairvote.app.box.com/v/rcv-kropf-content-analysis>

<sup>27</sup> [https://www.starvoting.us/star\\_dnc](https://www.starvoting.us/star_dnc)

# **Appendix B**

## **Officiating STAR Voting Elections**

Complete and up to date information on how to officiate an election using STAR Voting can be found at the STAR Voting website ([starvoting.us](http://starvoting.us)) under the Host Election tab.<sup>28</sup>

STAR Elections has a number of resources available, including options for quick and easy polling using the [star.vote](http://star.vote)<sup>29</sup> web app, a tutorial on officiating paper ballot elections<sup>30</sup>, a tutorial on online elections using Google Forms<sup>31</sup>, and a tutorial on automated tabulation of STAR ballots using Google Sheets<sup>32</sup>.

At the time of writing, STAR Elections is working on a new upgrade for the [star.vote](http://star.vote) web app which will includes a number of features that are not yet available on the web, but which are available to the public by contacting the STAR Elections Chair Jay Cincotta at [elections@equal.vote](mailto:elections@equal.vote)

STAR Elections offers free consultation on how to officiate STAR Voting elections, and election officiation is available through them as well, also by contacting [elections@equal.vote](mailto:elections@equal.vote) . All proceeds from the STAR Elections project go directly into the STAR Voting Action 501-c4 non-profit which is dedicated to helping fund the adoption of STAR Voting for governmental elections.

The Democratic Party of Oregon opted to use Simply Voting as the vendor for the e-voting option for the Delegate Selection Elections. More information on how to officiate a DPO STAR Voting election using Simply Voting<sup>33</sup> can be obtained by contacting DPO Chief of Staff Candy Emmons at [candy@dpo.orgz](mailto:candy@dpo.orgz)

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<sup>28</sup> <http://starvoting.us/elections>

<sup>29</sup> <http://star.vote>

<sup>30</sup> [starvoting.us/paper\\_ballots](http://starvoting.us/paper_ballots)

<sup>31</sup> [https://www.starvoting.us/google\\_forms](https://www.starvoting.us/google_forms)

<sup>32</sup> [https://www.starvoting.us/star\\_with\\_google\\_sheets](https://www.starvoting.us/star_with_google_sheets)

<sup>33</sup> <http://simplyvoting.com>

# Appendix C

## Standing Rule to Adopt STAR Voting for MultDems Elections<sup>34</sup>

AUTHOR: Michael Burlison & Sara Wolk

LOCATION: Standing Rule 15

REASON FOR AMENDMENT:

Accessible elections and widely recognized data showing that STAR Voting most accurately reflects the intent of voters.

CURRENT LANGUAGE:

- Standing Rule 2,
- Section 6 Balloting procedures.
- C. A majority is required to elect officers. If no candidate for an office receives a majority, balloting will repeat, with the candidate with fewest votes eliminated, until one candidate receives a majority of the votes cast.
- D. If there is a tie vote, the winner will be determined as agreed by the candidates, or if the candidates cannot agree, by a flip of a coin. [Language in red is Removed]
- Standing Rule 7
- Section 2
- 1. Each PCP shall have as many votes as there are positions open, and may mark up to that number on the ballot. Only one vote per candidate is allowed. Ballots with more candidates marked than positions open will be invalid.
- 2. Delegate and Alternate positions will be filled from the delegate ballot in descending order of votes received, creating a ranked order. Ties in the final Delegate or any Alternate position will be resolved by a coin flip.

NEW LANGUAGE:

Title: Voting Procedures for Elections.

1. Single candidates may be chosen from the floor by unanimous consent. A race with two candidates will be decided by “Choose One” majority vote.

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<sup>34</sup> [https://docs.google.com/document/d/17pyWt0qmY6Aw75HOJCdBjnaPeYEdySbd\\_bgT36R-k6M](https://docs.google.com/document/d/17pyWt0qmY6Aw75HOJCdBjnaPeYEdySbd_bgT36R-k6M)

2. All elections with more than two candidates for Multnomah County Democrats will use STAR Voting to determine the winner or winners. STAR Voting stands for Score-Then-Automatic-Runoff. Voting is conducted as follows:

- a. Candidates are scored from 0 (worst) to 5 (best).
- b. Ballots are tabulated in two rounds:
  1. **Scoring Round:** For each position for which a candidate appears on the ballot, the vote tally system will calculate the sum total of the scores received by each candidate and then determine the two finalists who received the greatest total scores.
  2. **Automatic Runoff Round:** Of the two finalists identified in the Scoring Round each voter's vote will be considered cast in favor of the candidate to whom the voter gave the greater score. If a voter gave both candidates the same score, the voter's ballot will be considered a vote of no preference between the finalists. The finalist with the majority of votes cast in their favor wins. (Bylaws Art. V. Section 3).
- c. For multi-winner elections, positions will be filled as described in section b., with an additional Automatic Runoff round conducted for each seat up for election.
- d. Ties will be broken as follows: A tie in the scoring round will be determined by an automatic runoff. A tie in the runoff round will be determined in favor of the candidate with the highest overall score in the scoring round. In the event that a tie can not be resolved as above, the winner will be determined as agreed by the candidates, or if the candidates cannot agree, by a flip of a coin.
- e. Ballots will contain the written instructions, an explanation, and relevant details from the example ballots in the images below. Candidate names will be printed on the ballot when possible with additional lines provided for candidates nominated from the floor when allowed. Ballots in other languages or formats will be provided on request with sufficient advance notice. Ballots will be anonymous.



# STAR VOTING

**SCORE - THEN - AUTOMATIC - RUNOFF**

Score candidates from 0 - 5 stars.

Those you leave blank receive a zero. If you don't have a preference you can give candidates the same scores.

Candidates:	Worst					Best
	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Abby</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Ben</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
<b>Carmen</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
<b>DeAndre</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
<b>Eric</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>(write-in)</b>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The two highest scoring candidates are finalists.  
The finalist preferred by the majority wins.



# STAR VOTING

**SCORE - THEN - AUTOMATIC - RUNOFF**

This election will elect    winners.  
Score all candidates from 0 - 5 stars. Those you leave blank receive a zero. If you don't have a preference you can give candidates the same scores.

Candidates:	Worst					Best
	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Abby	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ben	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Carmen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
DeAndre	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Eric	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
(write-in)	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The two highest scoring candidates are finalists for the first seat. An Automatic Runoff is conducted in which the finalist preferred by the majority wins. An additional Automatic Runoff is conducted for each seat up for election until all seats are filled.



## Appendix D

# Deschutes Democrats



December 14, 2020

Contact: Thomas Wrisley

541-410-8876

### **Deschutes Democrats to Use STAR Voting for Candidate Endorsements**

The Deschutes County Democratic Party announces that it will use Score. Then Automatic Runoff (STAR) voting, which was adopted overwhelmingly by precinct committee members of the Deschutes County Democratic Central Committee at their December 10 meeting. County party chair Jason Burge appointed a special committee to study various alternatives to plurality voting to endorse candidates for nonpartisan offices within Deschutes County, and the Committee's recommendation is the conclusion of extensive work, research, and analysis.

STAR is a two-phased voting system. In its first phase, voters score candidates on a scale of 0 to 5, similar to rating products on Amazon. The two highest-scored candidates then advance into a runoff, and whichever candidate is rated higher on more ballots wins.

Thomas Wrisley, chair of the special committee, says, "The Committee determined that STAR voting is the best fit for elections of this type. Its distinct advantages include its simplicity, its expressiveness and its remarkable resistance to vote splitting. Within this scope this a great opportunity to put this novel voting system to the test."

Confident in its deliberations, the Committee recommended STAR voting to the Deschutes Democrats, which was adopted by a ratio of nearly 7-to-1. Deschutes County Democrats are proud to be leaders in meaningful voter engagement and fostering creativity among its participants, as well as leading with foresight to strengthen our democratic processes.

The Deschutes Democrats look forward to using STAR voting to endorse candidates in the May 2021 elections.

# Appendix E

## Is STAR Voting auditable?

Yes. Any election can be audited, fully, regardless of the voting method. STAR Voting is not only auditable, but unlike some other voting methods it is also compatible with best practices in auditing and election integrity.

## Is STAR Voting precinct summable?

Yes, in STAR Voting, [any subset of ballots can be independently tallied fully](#). This means that if an election was run statewide, any precinct within that state could independently process and tally their own ballots. This also means that vote tabulation can begin and can proceed unobstructed as soon as votes start to come in.

While the process is a bit more involved than tallying a Choose-One Plurality election there is no need to wait until all ballots are in hand or until the Scoring Round tally is complete before beginning to tabulate the Automatic Runoff.

On election day, precinct summability is important because it means that preliminary results can be shared as soon as they are available, during the tally, in real time, just like they are with Choose-One Plurality voting. To see how STAR Voting results can update in real-time, click the ["show results"](#) button on any live poll on the star.vote website.

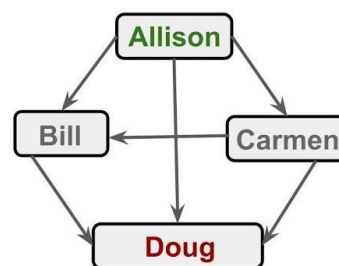
For STAR Voting a precinct sum or tally includes the total score for each candidate, and also the number of voters who preferred each candidate. Head-to-head pairwise preferences are displayed as a preference matrix.

## How to read a preference matrix

The preference matrix and chart below show voter preferences between any two candidates

	Total Score	Allison	Bill	Carmen	Doug
Allison	45		8, 2, 0	7, 3, 0	9, 1, 0
Bill	22	2, 8, 0		4, 5, 1	7, 2, 1
Carmen	31	3, 7, 0	5, 4, 0		8, 1, 1
Doug	10	1, 9, 0	2, 7, 1	1, 8, 1	

Numbers in each cell represent preferences for and against the candidate on the left.  
Legend: For, Against, Neutral



Voter Preferences

Most voting methods are [precinct summable](#), including Choose-One Plurality voting, Score Voting, and Approval voting, but it's worth noting that Ranked Choice Voting (Instant Runoff) is

not. In Ranked Choice Voting a preference matrix is not sufficient for summing ballots due to the fact that not all rankings will ultimately be tallied.

## **A note on Risk-Limiting-Audits and recounts:**

For small scale non-governmental elections, full recounts are a simple option. When paired with other election integrity best practices, full recounts are always the most thorough way to verify the integrity of an election, especially if an error or foul-play is expected.

Audits and recounts are an important part of election integrity best practices, and every election should have a plan in place for this, but full recounts can be time consuming and expensive, especially for large, governmental elections. [Risk limiting audits](#) for STAR Voting are a sufficiently accurate and reliable method for doing partial recounts as needed to confirm an election's validity.

Risk limiting audits, or (RLA)s, prescribe a number of ballots to be recounted depending on the margin of victory. If a race is won decisively, then an audit will look at a small fraction of ballots, but if the margin is smaller a larger recount is prescribed. If the RLA finds that the audit results are consistent with the reported election outcome, or if the margin of error is within expected limits, the election is certified. If the evidence from the initial sample does not provide enough evidence to meet the risk limit, the sample size is expanded until it does.

Risk Limiting Audits for STAR Voting can be done using the same tools and similar protocols as are used for plurality voting.

Risk limiting audits are possible for most voting methods, including Choose-One Plurality voting, Score Voting, and Approval voting, but it's worth noting that while it is possible for Ranked Choice Voting (Instant Runoff) the complexity of the process, the existence of exhausted ballots, and the fact that not all ballot data is counted in RCV may present serious barriers for the real world use of RCV RLA's in practice. Procedures for efficient audits of Single Transferable Vote are still in the research phase.

## **How does a Risk Limiting Audit For STAR Voting work?**

All risk-limiting audits start by defining some amount of allowable risk, called "alpha". This is set arbitrarily by statute, and is a percentage risk such as "5%" or "10%". For instance, if a jurisdiction sets the allowable risk at 5%, that means that, under the pessimistic assumption that the election is NOT valid, there can be no more than a 5% risk of incorrectly validating the tabulation of the election.

A few parameters determine the size of audit needed. First, the smaller the allowable risk you set, the more ballots you will end up having to check.

The next parameter is the win margin. The closer the race, the more ballots you will have to check.

The third parameter for risk-limiting audits is known as “gamma”. This is a safety factor, not for the final outcome of the audit, but for the chances you might have to check multiple ballot sets in sequential audit rounds, or even fall back to a full ballot count. The lower gamma is, the lower the number of ballots you will re-check in the initial round of the audit, but the higher the chances you might have to go back and re-check more. For STAR voting, you should use 1.1 if it is easy to add ballots to the audit (“pull new ballots”), and 1.2 if it is harder.

The formula for all risk limiting audits is complex (regardless of the voting method,) and auditing for governmental elections is handled by professionals, but for those running non-governmental elections, or for those interested in the matter, there is an [online audit calculator](#) for running Plurality RLAs, which can also be employed for auditing STAR Voting.

The main difference between auditing Plurality and STAR using the online audit calculator is that you will run the calculations twice, once for the Scoring Round, and again for the Runoff Round. Your audit's result — the number of ballots you will need to check — will be whichever round's output number is larger. Checking those ballots will allow you to limit the risk for both rounds.

## Instructions for using the [Online Audit Calculator](#) for STAR Voting:

### [Before you begin:](#)

1. Decide on the overall Allowable Risk for your election. (See above for more information.) This number will be referred to as "alpha" for your audit. The calculator will need this as a fraction or decimal.

For example, if the overall alpha is 5% you would divide this into two parts, as described below; 3.33% for the scoring round, which would be input as “0.0333” in the calculator, and 1.67% for the runoff round, which would be input as “0.0167” in the calculator.

2. Set the “gamma”, to either 1.1 or 1.2, as explained above.
3. Determine the total number of votes cast in the race to be audited.

### **Audit Election:**

#### [Calculate Size for Scoring Round Audit:](#)

**Step 1:** Calculate the margin of victory for the Scoring Round,  $m$ :

- a.) Find the second- and third-highest scoring candidates. Let's call those B and C, respectively.
- b.) Find  $c$ , the difference in total scores between B and C.
- c.) Calculate the minimum possible margin of victory,  $m$ , by dividing  $c$  by 5, and then dividing that result by  $t$ , the total number of ballots.  $(c/5)/t$

d.) On the [RLA calculator](#), you will use the second form ("Risk-limiting audit parameters: comparison audits") to plan your audit. Input your  $m$  margin in the first field, where it says: "Margin of victory: the closest margin between a winner and a loser as a fraction of the total number of ballots for the given contest."

**Step 2:** Multiply your Allowable Risk (alpha) by  $2/3$  and input this number into the calculator where it calls for "Risk limit (alpha) as a fraction."

For example, if the overall alpha is 5% (0.05), the allowable risk of error for this round is 3.3% (0.033 in the calculator.)

**Step 3:** Set overstatement and understatement rates. The default values (.001, .0001, .001, and .0001) are appropriate for machine-counted ballots; these correspond to error rates of 1 in 1,000 for mistaking valid votes for undervotes in either direction, and 1 in 10,000 for mistaking a vote for one candidate with a vote for another. If you are hand-counting ballots, you might want to allow for higher error rates, such as 0.01, 0.005, 0.01, 0.005 respectively.

**Step 4:** Click "Calculate" to determine the number of ballots needed to audit the Scoring Round.

### **Calculate Size for Runoff Round Audit:**

**Step 5:** Calculate the margin of victory for the runoff round,  $n$ . This is calculated the same way as a "plurality-style" margin - the winning margin in the Runoff Round, divided by the total number of all ballots:

- a.) Find  $d$ , the difference in total number of votes for the runoff winner, Candidate W, and the runner up, Candidate R.
- b.) Calculate the minimum possible runoff margin of victory,  $n$ , by dividing  $d$  by  $t$ , the total number of ballots.

**Step 6:** Take the overall alpha for the RLA, and multiply by  $1/3$  for the alpha in the calculator.

**Step 7:** Leave other fields untouched for now. Overstatements and understatements should be set to 0. The field for "gamma" should be set to 1.1.

**Step 8:** Click "Calculate" to determine the number of ballots needed to audit the Runoff Round.

### **Perform Audit for Both Rounds Simultaneously:**

**Step 9:** Identify ballots to audit:

- a.) Compare the numbers calculated in steps 4 and 8. The larger of these two numbers is the total number of ballots needed for your initial Risk Limiting Audit.
- b.) Select a random sampling of ballots to audit.

**Step 10:** Evaluate the selected ballots for the scoring round, comparing scores for candidates B and C on each ballot to their scores on the cast vote record. Document any discrepancies you may find. Discrepancies should be recorded as overstatements and understatements. For STAR Voting in the Scoring Round an understatement is the number of points a candidate was given in error which made their "[margin of victory appear smaller than it really was.](#)" and an

overstatement is the number of points a candidate was given in error which "[make the margin of victory appear larger than it really was.](#)"

The overstatements and understatements can be kept in 4 running tallies:

1. The total score discrepancy of the overstatements on ballots where the overstatement is less than or equal to 5 points. This total, divided by 5 and rounded up to the next whole number, is the number you'll use for "1-vote overstatements" in step 12.
2. The total score discrepancy of the overstatements on ballots where the overstatement is greater than 5 points. This total, divided by 10 and rounded up to the next whole number, is the number you'll use for "2-vote overstatements" in step 12.
3. The total score discrepancy of the understatements on ballots where the understatement is less than or equal to 5 points. This total, divided by 5 and rounded up to the next whole number, is the number you'll use for "1-vote understatements" in step 12.
4. The total score discrepancy of the understatements on ballots where the understatement is greater than 5 points. This total, divided by 10 and rounded up to the next whole number, is the number you'll use for "2-vote understatements" in step 12.

For example: If a ballot had originally been counted as a score of 4 for B, but is in fact a score of 2 for B, then that would be counted as an overstatement of 2 for B because the difference between the original count and the audit count is 2 points, and because the error increased the margin of victory between B and C. This would go in tally 1 because 2 is less than 5. If this same exact error was found 11 times, the total number you would put in the calculator for 1-vote overstatements would be  $(2 \times 11) / 5 = 4.4$ , rounded up to 5.

**Step 11:** Evaluate the selected ballots for the runoff round, comparing the number of ballots with a preference for candidate W (the winner) vs R (the runner-up,) to the corresponding preferences on the cast ballot record. Document any discrepancies you may find.

As above, discrepancies should be recorded as overstatements and understatements. Overstatements and understatements in the Runoff Round are tallied as 1-vote or 2-vote over/understatements and this number indicates how incorrect the original error was. In the runoff there are three options. A vote may be a vote for the winning candidate, Candidate W, a vote of No-Preference, or a vote for the runner up, Candidate R.

For example, a vote for Candidate W which was erroneously recorded as a vote of no preference represents a 1-vote change. A preference for Candidate W which was erroneously recorded as a preference for Candidate R is recorded as a 2-vote change. If the error increased the lead for A over B, then that is an overstatement. If the error decreased the lead for W then that is an understatement.

### **[Check if audit is complete:](#)**

**Step 12:** Repeat steps 1-8, but use the upper block in the calculator ("Risk-limiting audit parameters"). In step 3, instead of setting approximate over- and under-statement rates, input the total numbers calculated in step 10 into the fields for 1- and 2-vote over- and under-statements. Similarly, in step 6, input the numbers from step 11.

**Results:** If the number of ballots the calculator tells you to recount for both rounds is not higher than the number you have already recounted, your audit is complete.

If not, then repeat steps 9-12, drawing only any new ballots needed. For instance, if you had previously recounted 100 ballots, and the new highest number needed was 150, then draw only 50.

**A note on the audit parameters above:**

The procedure used above makes a few “conservative” simplifications in order to keep the formulas involved relatively straightforward. That is to say, in practice, it will generally ask you to check a few more ballots than would be strictly necessary, and thus result in a risk even lower than the minimum you set — a better audit than the one you asked for. If necessary, a qualified statistician could design a procedure that required checking fewer ballots and didn’t have this extra safety margin, but the formulas for deciding how many to check would be substantially more complex. In particular, the procedure here for dividing the risk between the two rounds is conservative, as is the tallying step where you round up the one-vote and two-vote discrepancies for the score round.