Flat Spot or Fluke?

What your velocity ladder can really tell you, and how many shots per rung it needs

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The short version

A velocity ladder loads a few charges in small steps and looks for a “flat spot”: a stretch where the speed stops climbing even though each rung adds powder. Many shooters load in the middle of it. This study asked a simple question: **when a ladder shows a flat spot, is it real, or is it just normal shot-to-shot variation?**

Here is what we found for a ten-rung ladder whose rungs add about 10 fps each, with no drift during the session. “Looks flat” means the first and third of the three flattest rungs are within 5 fps of each other (section 3 explains that choice). The “real flat spot” is three perfectly level rungs, the easiest kind to find. Both columns use the same test, so read each pair side by side:

Shots per rung	Very consistent load (SD 5)		Good load (SD 8)		Author's average (SD 11)	
	No flat spot, looks flat anyway	Real flat spot, picked and looks flat	No flat spot, looks flat anyway	Real flat spot, picked and looks flat	No flat spot, looks flat anyway	Real flat spot, picked and looks flat
1 shot	12%	71%	51%	54%	64%	42%
3 shots	0.1%	83%	9%	73%	32%	63%
5 shots	<0.1%	90%	1%	78%	12%	71%
10 shots	<0.1%	98%	<0.1%	86%	0.9%	78%

A stricter reading, all three rungs within 5 fps of each other, does not change the answer for one shot per rung: at SD 8 a load with no flat spot looked flat 17% of the time, and a real flat spot was picked and looked flat 16% of the time.

- **1 shot per rung:** on a good load or an average one, a load with no flat spot looked flat about as often as a load with one was read correctly (51% against 54% at SD 8; at SD 11 it was worse, 64% against 42%). Only a very consistent load did much better (12% fooled at SD 5), and a three-shot rung can't tell you whether your load is that consistent.
- **3 shots per rung:** still fooled about one ladder in three on an average load (32% at SD 11); 9% on a good one (SD 8).
- **5 shots per rung:** 12% fooled at SD 11 and 1% at SD 8, at 50 rounds for a ten-rung ladder.
- **10 shots per rung:** rarely fooled (0.9% at SD 11), at 100 rounds for a ten-rung ladder.

A flat spot is a place to look, not an answer, at any number of shots. These figures say how often a ladder is fooled, not how likely it is that the flat spot you see is real; that also depends on how common real flat spots are, and the larger published tests found few. To find out, check it separately: longer strings at the pick and at the rungs on either side of it, or the whole ladder fired again on another day.

Drift changes all of this. A ladder is fired in order, so speed that drifts during the session (barrel heat, fouling, changing conditions) is mixed in with the charge, and more shots per rung don't average it out. With speed wandering about 4 to 6 fps from rung to rung, three-shot ladders were fooled 27% to 42% of the time and ten-shot ladders 9% to 29% (SD 8, 10 fps rungs). Those sizes are assumptions; the one long string in the author's data climbed about 2 fps per shot, more than any drift modeled here.

Your charge range comes from published load data, and nothing here suggests changing it or your step size; the only thing this study supports changing is how many shots you fire per rung and how you check a pick.

1. Background

A velocity ladder loads one or a few rounds at each of several rising powder charges and records the speed of each. Scott Satterlee's widely used ten-round version fires one shot per rung and looks for “two or three charge weights that develop the same speed,” then loads in the middle of that flat stretch [1, 2]. No speed cutoff is given, and the method's presenters say it depends on very consistent handloads [1]. Dan Newberry's Optimal Charge Weight (OCW) method is often grouped with it, but it reads where groups land on paper, not speed, and is not tested here [3].

Whether velocity flat spots are real has been argued for years. The published tests that fired larger numbers of shots have mostly not found them again, though those tests are few and small. Hornady's engineers said on their podcast (no data table published) that, firing many shots per charge, speed rose in a nearly straight line and flat spots seen in small samples did not repeat [4, 5, 6]; Hornady's own list of reloading rules now says apparent flat spots in ladder tests “are typically the result of small sample sizes” [7]. Tyler Freel fired more than 600 rounds in three factory hunting rifles, took the middle of the three consecutive charges with the smallest total change in speed as each ladder's pick, and found no pick that stood out in 30-shot samples fired on other days, while noting that this does not prove ladder tests never work [8]. Applied Ballistics re-fired ladders and concluded that a single pass “will always show one or more relative flat spots,” but not in the same place each time [9]. Experienced competitors, including the method's originator, report flat spots that hold up for them [1, 10], and Applied Ballistics reports one statistically significant result in its raw data [9] (we could not see how many comparisons it came from). We found no large-sample test that showed a velocity flat spot repeating.

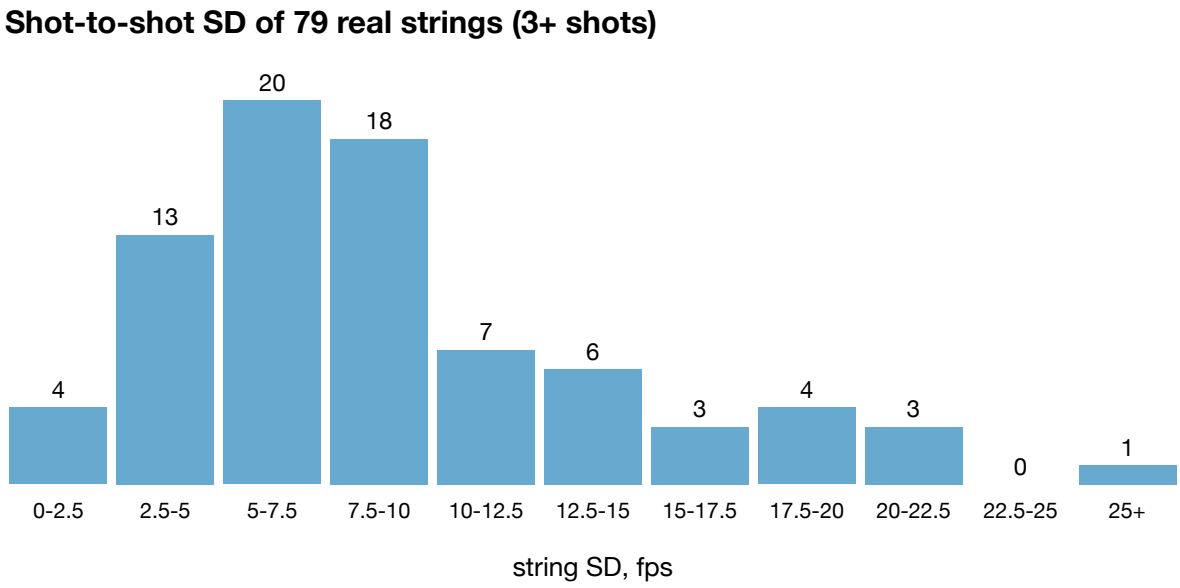
Why would a ladder show a flat spot that isn't there? Look at enough places for a pattern and you will find one somewhere by chance far more often than at a spot you named ahead of time [11, 12]. A ten-rung ladder gives a shooter plenty of places to look. Others have drawn simulated ladders to show this [13, 14], but we found no published figures for how often a ladder shows a flat spot that isn't there, or how often it finds one that is (we could read Applied Ballistics' ladder chapter only through a quoted summary [9]). This study works those figures out.

2. The real chronograph data

To keep the test realistic, the amount of shot-to-shot speed variation came from real shooting: every Garmin Xero session the author had on file (2026-03 to 2026-09), with duplicate copies removed. The data file lists the date, time and speeds of each session and the SD the Garmin showed: no charge, powder or bullet information.

- 89 sessions had two or more shots, and all of them are in the data file. The speed-spread figures come from the 79 strings with three or more shots (338 shots in all); the 10 two-shot strings were used only for the Garmin check below.
- Most strings are three- to five-shot rungs fired minutes apart, with average speed stepping up through the morning: ladder rungs from the author's own workups with several different loads. Each session was treated as one rung.

- The typical (middle) string had an SD of 8.0 fps; half the strings fell between 5.5 and 11.3. Pooled across all strings (the standard way to combine SDs), the SD was 11.2 fps, and the true figure is most likely between 9 and 13 fps. The middle string read lower, partly because SDs from three-shot strings tend to come out low. These are workup rungs from one shooter, many at charges later set aside, so they describe ladders, not finished loads. The study uses SD 5 for a very consistent load (the method's presenters say it needs very consistent handloads [1]), 8 for a good load and 11 for the author's own workup average, and checked 15 as well. With rungs adding 10 fps or more, more shots per rung always helped, but the numbers move a lot with SD: at SD 15 with 10 fps rungs, even five shots per rung showed a false flat spot 37% of the time.
- Drift inflates the average. The one 20-shot string climbed through the session and reads SD 16.9; with its straight-line climb taken out it is about 10.
- A standard check for chronograph misreads flagged 6 shots. A check that sensitive flags a few shots even in perfectly normal data, so they were kept; leaving them out lowers the average SD to 10.5 fps. No speeds were impossible and no strings were duplicates. The strings are too short to show whether real speeds follow a bell curve.
- The first shot of a string ran about the same as the rest (-0.8 fps on average across 31 strings of four or more shots). Most of those were mid-session rungs, not cold-bore shots; on the first string of each day (15 days), the first shot averaged -4.2 fps and was slower on 10 days, too few days to tell apart from chance.
- **A side finding about the Garmin:** the SD the Garmin reports is figured slightly differently from the usual textbook SD. It matched the “divide by the number of shots” version on all 89 strings, including all 85 where the two versions differ by more than 0.3 fps. On a three-shot string that reads about 18% lower than the usual SD, and about 11% lower on five shots. We found no Garmin documentation saying which way it figures SD, and this was one chronograph, so others may differ. All SDs in this study are the usual kind, worked out from the speeds: if your Garmin shows SD 6.5 on three-shot rungs, that is about SD 8 here, and 9 on three shots is about 11. On a ten-shot string the difference is only about 5%.



3. How the test was done

A computer fired millions of simulated ten-rung ladders where the true answer is known. With no flat spot, each rung's true average speed is the same amount faster than the one before (5, 10, 15, 20 or 30 fps). Each shot is that true speed plus normal shot-to-shot variation, spread in a bell curve (the usual assumption for shot-to-shot speed) with an SD of 5, 8, 11 or 15 fps. The “shooter” sees only the average of the 1, 3, 5 or 10 shots fired at each rung, exactly as a chronograph shows it. Each combination was run 20,000 times, so every percentage is within about ±0.7 points (95% of the time) of what the model would give with endless runs. That says nothing about how well the model matches a real rifle.

A real flat spot was built into a second batch of ladders: three perfectly level rungs in the middle (rungs 5, 6 and 7 of ten add no speed). That is the clearest flat spot possible. One that only slows the climb is harder to find (Appendix).

How each ladder was read. A common way, and the one Outdoor Life's test spelled out [8]: find the three rungs in a row whose speed changed the least from first to last, and load the middle one. That always picks something, so we asked two things. When the load has no flat spot, how often does that pick still look flat (first and third rung within 5 fps of each other)? And when the load has one, how often does the pick land on one of its three rungs and pass the same test? (How often the pick merely lands on it, flat-looking or not, is in section 4.)

The 5 fps cutoff is our choice; no published method gives one. Under it, the middle rung can be anywhere, so a stretch that zigzags still counts. A looser cutoff shows more false flat spots and a stricter one fewer: with one shot per rung (10 fps rungs, SD 8), calling 10 fps “flat” raised the false rate from 51% to 86%, and requiring all three rungs within 5 fps of each other lowered it to 17%. The exact percentages depend on where you draw the line; that more shots per rung help does not (at five shots the same three readings were 1%, 18% and 0.8%). On ladders whose rungs add only about 5 fps, the 5 fps test is loose: two rungs of true climb is only 10 fps, so even ten shots per rung looked flat 52% of the time at SD 8 and 78% at SD 11.

Two other ways of reading a ladder were also run (section 4). The method's own description accepts *two* rungs at the same speed, so we also took the two neighbouring rungs closest in speed and called them flat if they were within 5 fps. And many shooters fire the whole ladder a second time and keep a flat spot only if it shows up in the same place both times, so we tested that too.

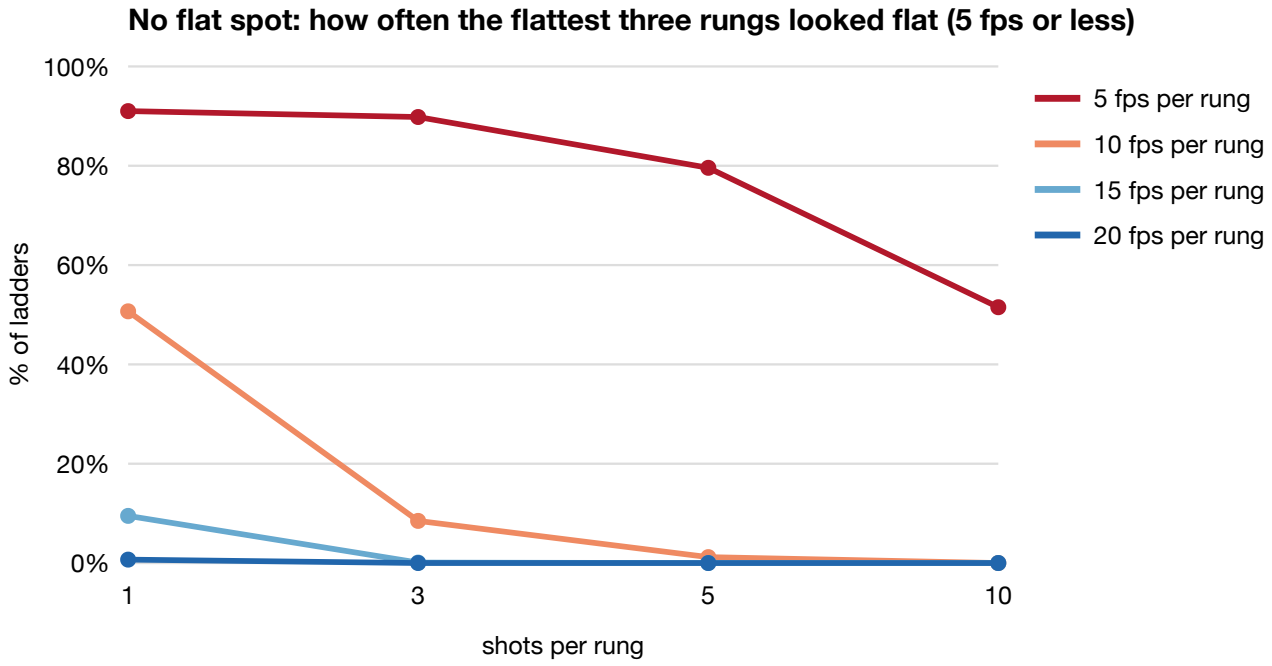
A second, stricter yes/no rule was also tested; it is in the Appendix. Its results were checked against a formula (which treats the ladder's average climb as known) that matched the simulation to within 0.4 points. The flattest-three figures have no simple formula and rest on the simulation alone.

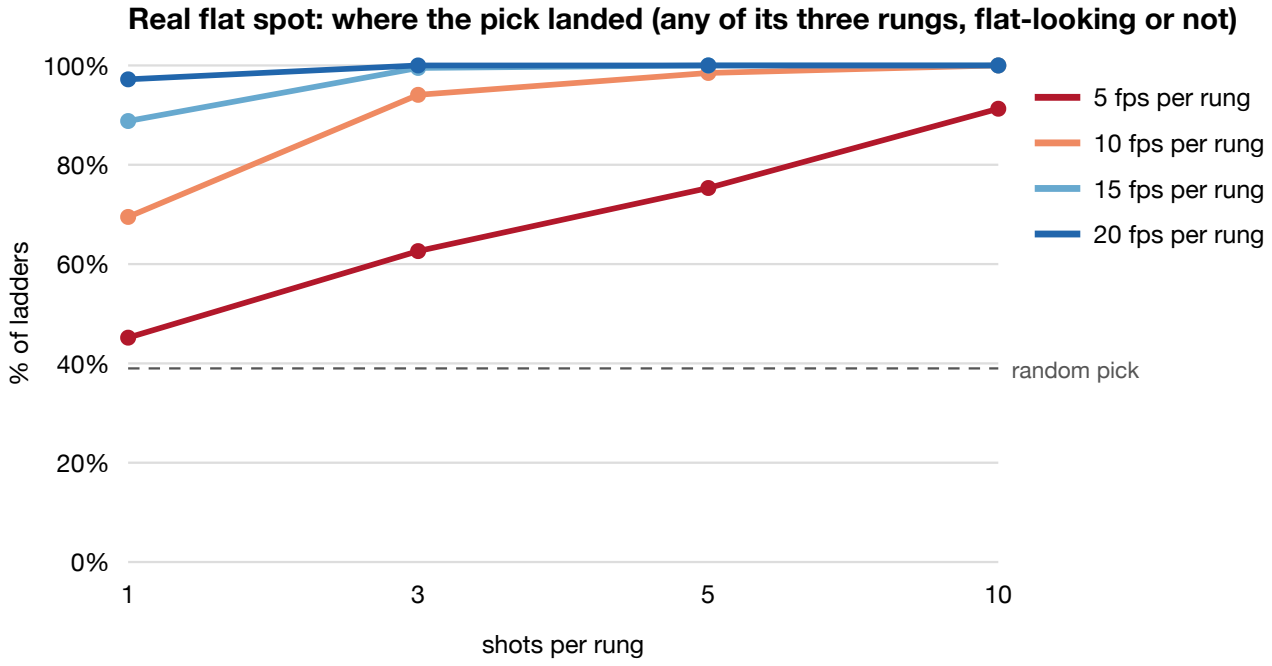
4. Results

For rungs that add about 10 fps, the tables in the short version have the main answer. Here it is for every step size, for a good load (SD 8 fps); SD 11 is in the Appendix:

fps added per rung	No flat spot: flattest three look flat (first and third rung within 5 fps)				Real, perfectly level flat spot: picked and looks flat (picked, flat-looking or not)			
	1 shot	3 shots	5 shots	10 shots	1 shot	3 shots	5 shots	10 shots
5	91%	90%	80%	52%	42% (45%)	61% (63%)	74% (75%)	90% (91%)
10	51%	9%	1%	<0.1%	54% (70%)	73% (94%)	78% (99%)	86% (>99.9%)
15	10%	0.1%	<0.1%	<0.1%	52% (89%)	61% (99.5%)	69% (>99.9%)	84% (>99.9%)
20	0.7%	<0.1%	<0.1%	<0.1%	45% (97%)	57% (>99.9%)	68% (>99.9%)	84% (>99.9%)
30	<0.1%	<0.1%	<0.1%	<0.1%	36% (99.9%)	56% (>99.9%)	68% (>99.9%)	84% (>99.9%)

The number in brackets is where the ladder points, whether or not that stretch passes the 5 fps test. A random pick lands on one of the three level rungs about 39% of the time and on the middle one about 13% of the time; that is the bar the bracketed number has to beat.





The two-rung reading is far easier to fool (10 fps rungs). On a load with no flat spot, the two closest neighbouring rungs were within 5 fps in 94% of one-shot ladders, 85% of five-shot ladders and 56% of ten-shot ladders at SD 8 (94% at five shots, SD 11). A real flat spot was picked and passed in 27%, 62% and 87%. Two rungs at the same speed is weak evidence at any practical shot count.

Firing the ladder twice and keeping a flat spot only if it passes both times, in the same place (within one rung), cut the false rate sharply: with one shot per rung (20 rounds in all), 9% at SD 8 and 14% at SD 11, against 51% and 64% for a single pass. It also found a real flat spot less often (24% at SD 8), because it

has to pass twice. In this model, with no drift, two one-shot passes did about as well against false flat spots as one three-shot pass (9% at SD 8) but found real ones less often (73%). Its real advantage, that the two passes don't share the same drift, was not modeled.

Three more things came out of the test:

- **A rung that reads slower than the one before is normal.** With rungs adding 10 fps, at least one rung somewhere on the ladder read slower than the one before in 91% of one-shot ladders and 46% of three-shot ladders, from ordinary shot-to-shot variation alone.
- **Longer ladders give more chances to be fooled.** With one shot per rung, a false flat spot showed up in 22% of five-rung ladders but 68% of fifteen-rung ladders.
- **Drift doesn't average out, and it cuts both ways.** If speed fades or wanders during the session, more shots per rung don't remove it (Appendix). Speed that fades down the ladder makes false flat spots more common; speed that climbs, as the author's long string did, makes real ones harder to find: with a 20 fps climb, a real flat spot at three shots per rung was picked and looked flat 64% of the time, against 73% with no drift. A long confirming string fired later or on another day drifts too, so it can also hide a real difference or suggest a false one.

5. What it means at the bench

- **Your charge range comes from published load data.** Nothing here suggests charges, step sizes or going past published limits. The results depend as much on how much speed each rung adds as on shots per rung, but the step comes from your load data; this study only says how many shots the ladder you already shoot needs.
- **Know your fps per rung.** Take the average speed of your top rung, subtract your bottom rung, and divide by the number of steps between them.
- **Know your real shot-to-shot SD.** Take it from a longer string of one load (10 or more shots at a steady pace), not from one three-shot rung. If the second half of the string runs faster or slower than the first, that is drift, and it will inflate the SD. Know how your chronograph figures SD.
- **Treat a flat spot as a place to look, not an answer, at any number of shots.** With 10 fps rungs and an SD of 8, 51% of one-shot ladders with no flat spot show a three-rung stretch whose first and last rung are within 5 fps. Three to five shots per rung make a ladder much harder to fool, but how much depends on your SD (at five shots, 1% at SD 8 but 12% at SD 11), and none of it makes a flat spot you see trustworthy on its own.
- **More shots per rung means more rounds at the top of the ladder.** Fire the ladder from the lowest rung up, check for pressure signs as your load manual describes after every rung, and stop at the first sign. This study is about speed only and says nothing about pressure.
- **Check a pick separately.** Longer strings at the pick and at the rungs on either side of it (a long string at one rung says nothing about whether the speed stopped climbing around it), or the whole ladder fired again on another day. Hornady and Outdoor Life checked their picks with longer strings [4, 8]; this study did not simulate that step, or how best to split a fixed number of rounds between rungs and shots.
- **Don't read a flat spot into one slow rung.** With rungs adding 10 fps, at least one rung read slower than the one before it in 91% of one-shot ladders from ordinary variation alone.

- **Keep the session steady.** Keep the ammo shaded and at one temperature, let the barrel cool to the same point before each rung, fire fouling shots after cleaning and before rung one, keep the suppressor and chronograph setup the same for the whole ladder, and load every rung in one sitting from one lot of components. Anything that moves a whole rung at once acts like drift, and more shots per rung won't average it out.

6. Limits

- Shot-to-shot variation is modeled as a bell curve with the same SD at every rung, including the flat spot. If a real flat spot is also tighter, as some shooters report, it would be easier to find than shown here. If flyers are more common than a bell curve allows, false flat spots at five to ten shots are somewhat more common than shown.
- The real flat spot is always three rungs wide, so on ladders with small steps it stands for a narrower range of charge than on ladders with big steps.
- Drift during a session was only sampled (Appendix); real sessions can do better or worse.
- The real data comes from one shooter and one chronograph. If a session mixed charges, or speed drifted within it, the SD here is too high; if shots were deleted on the device, too low.
- Results are for ten-rung ladders unless stated.
- “Flat” is defined by a cutoff we chose (first and third rung within 5 fps); section 3 shows how the numbers move with it.
- This study looks at speed only, not group size, point of impact or pressure, and it cannot say whether a particular load has a flat spot. It says whether a ladder can tell.
- It measures how often a ladder is fooled, not how likely it is that a flat spot you see is real. That also depends on how common real flat spots are, which this study cannot say.
- Nothing here shows that real flat spots do not exist, or that one you have confirmed across barrels and seasons is a fluke; it shows how many shots a single ladder needs to tell.

Flat spot or fluke?

On a one-shot ladder with rungs about 10 fps apart, a flat spot is not good evidence. On a good load (SD 8), a load with no flat spot showed one 51% of the time, about as often as a real flat spot was picked and looked flat (54%). Only a very consistent load (SD 5) did much better.

More shots per rung make a ladder much harder to fool, but at any shot count a flat spot is a place to look, not an answer. At five shots, a load with no flat spot showed one 1% of the time at SD 8 and 12% at SD 11, with no drift; drift during the session can still fool it.

Whether your load has a real flat spot takes a separate check: longer strings at the pick and at the rungs on either side of it, or the whole ladder fired again on another day. Hornady, Applied Ballistics and Outdoor Life reported that, with larger samples, the flat spots their ladders showed mostly did not repeat; Applied Ballistics reported one statistically significant result.

Data and code

Everything needed to check this study is included with it: `chronograph_strings.csv` (the 89 real strings: date, time, speeds and the Garmin's SD), `vet_chrono_data.py` (the real-data checks; `build_report.py` works out the rest of the real-data figures from the same file), `simulate.py` (the test; with its fixed seed and NumPy 2.0.2 it reproduces `results.csv`, `sensitivity.csv`, `closed_form.csv` and `extra.csv` exactly), and `build_report.py` (builds this document from those files). Python 3 and NumPy.

Disclosure

The author makes Loadscope, software that scores load development ladders. Loadscope gives velocity flat spot a 5% weight in its overall score by default (users can change it), a setting made in July 2026, before this study. No outside funding.

References

1. 6.5 Guys with S. Satterlee. “10 Round Load Development Ladder Test,” video, Season 4 Episode 4, May 6, 2017. youtube.com/watch?v=ACyfeeBHVOA
2. 6.5 Guys. “10 Round Load Development Ladder Test,” May 21, 2017. 65guys.com/10-round-load-development-ladder-test/
3. Newberry, D. “OCW Overview” and “OCW Instructions,” Dan Newberry's OCW Load Development System (archived March 3, 2010, web.archive.org).

4. Hornady Podcast, Episode 50, “Your Groups Are Too Small,” December 15, 2022.
5. Hornady Podcast, Episode 52, “Your Groups Are Still Too Small: A Follow Up,” December 29, 2022.
6. Hornady Podcast, Episode 162, “Uncomfortable & (Maybe) Mind-Altering Ballistic Realities,” with J. Siewert, January 2, 2025.
7. Hornady. “The 12 Rules of Precision Reloading,” The Hole Story blog, June 9, 2026, rule 4. hornady.com/blog/12-rules-of-precision-reloading
8. Freel, T. “Rifle Nodes: How You've Been Wasting Your Time and Money on Load Development,” Outdoor Life, April 1, 2024 (updated April 3, 2024). outdoorlife.com/guns/rifle-nodes/
9. Litz, B. et al. *Modern Advancements in Long Range Shooting, Volume III*, Applied Ballistics, 2022 (ladder testing chapter). Conclusion as quoted by C. Zant in a reply comment of February 2, 2025, on “Creighton Audette Ladder Testing” (2012), precisionrifleblog.com/2012/07/13/creighton-audette-ladder-testing/
10. AccurateShooter forum, “Velocity Flat Spots?” thread, June 2021. forum.accurateshooter.com/threads/velocity-flat-spots.4039384/
11. Gelman, A. and Loken, E. “The garden of forking paths,” working paper, Columbia University, 2013.
12. Gross, E. and Vitells, O. “Trial factors for the look elsewhere effect in high energy physics,” Eur. Phys. J. C 70 (2010) 525–530.
13. “entoptics,” post of August 10, 2020, “Help with Satterlee velocity test” thread, Long Range Hunting forum, archived copy of September 18, 2020: web.archive.org/web/20200918235517/https://www.longrangehunting.com/threads/help-with-saterlee-velocity-test.247047/
14. Reeves, J. *Data-Driven Reloading*, Lessons 5 and 7, reevesjustin.github.io/data-driven-reloading/ (2025–2026).

Appendix: the detailed results

For readers who want to check the numbers. All ladders have ten rungs unless stated. Tables that repeat a setting from the main text come from separate runs, so they can differ from it by about a point.

A1. The flattest-three reading at SD 11 fps

fps added per rung	No flat spot: flattest three look flat (first and third rung within 5 fps)				Real, perfectly level flat spot: picked and looks flat (picked, flat-looking or not)			
	1 shot	3 shots	5 shots	10 shots	1 shot	3 shots	5 shots	10 shots
5	86%	93%	91%	78%	36% (41%)	49% (52%)	58% (60%)	75% (76%)
10	64%	32%	12%	0.9%	42% (55%)	63% (81%)	71% (92%)	78% (99%)
15	29%	2%	0.1%	<0.1%	45% (74%)	56% (96%)	60% (99%)	71% (>99.9%)
20	8%	<0.1%	<0.1%	<0.1%	42% (88%)	47% (99%)	54% (>99.9%)	69% (>99.9%)
30	0.2%	<0.1%	<0.1%	<0.1%	31% (98%)	43% (>99.9%)	53% (>99.9%)	69% (>99.9%)

The number in brackets is where the ladder points, whether or not that stretch passes the 5 fps test. A random pick lands on one of the three level rungs about 39% of the time and on the middle one about 13% of the time; that is the bar the bracketed number has to beat.

A2. A stricter yes/no reading

Some shooters only call it a flat spot when two rung-to-rung rises in a row are each small: here, under a third of the ladder's average climb per rung. This rule rarely shows a false flat spot once there are three or more shots per rung, but it also misses many real ones, because shot-to-shot variation often makes a truly level stretch look like it is still climbing. SD 8 fps:

fps added per rung	No flat spot: ladder flagged			
	1 shot	3 shots	5 shots	10 shots
5	47%	25%	14%	4%
10	19%	3%	0.6%	<0.1%
15	5%	0.1%	<0.1%	<0.1%
20	1%	<0.1%	<0.1%	<0.1%
30	<0.1%	<0.1%	<0.1%	<0.1%

Real flat spot: flagged in the right place (by luck)			
1 shot	3 shots	5 shots	10 shots
38% (20%)	37% (10%)	37% (5%)	38% (2%)
37% (8%)	38% (1%)	42% (0.2%)	51% (<0.1%)
38% (2%)	46% (<0.1%)	54% (<0.1%)	68% (<0.1%)
40% (0.4%)	54% (<0.1%)	65% (<0.1%)	81% (<0.1%)
50% (<0.1%)	72% (<0.1%)	83% (<0.1%)	95% (<0.1%)

The number in brackets is how often a ladder with no flat spot gets a flag in the same place by luck. The difference is what the ladder actually earned.

Making the rule looser finds more real flat spots and shows more false ones (rungs adding 10 fps, SD 8):

setting	1 shot: false	1 shot: found	3 shots: false	3 shots: found
a quarter of the ladder's average climb per rung	14%	34%	1%	33%
a third (the rule used above)	19%	36%	3%	38%
a half	31%	44%	9%	51%
two thirds	47%	52%	25%	62%

A3. Ladder length (1 shot per rung, 10 fps rungs, SD 8)

setting	no flat spot: flattest three 5 fps or less	strict rule: false flat spot
5 rungs	22%	6%
6 rungs	29%	9%
8 rungs	41%	14%
10 rungs	50%	19%
12 rungs	58%	23%
15 rungs	68%	28%

A4. A flat spot that still climbs (10 fps rungs, SD 8, 3 shots)

setting	flattest three: picked and looks flat	flattest three: picked, flat-looking or not	strict rule: found
completely level	73%	94%	38%
still climbs a quarter as fast	57%	89%	21%
still climbs half as fast	31%	77%	9%

A5. Speed that drifts during the session (10 fps rungs, SD 8)

Rungs are fired in order, so drift pushes later rungs the same way. Drift that slows the rifle down the ladder makes false flat spots more common; drift that speeds it up makes them less common.

setting	1 shot: false flat spot	3 shots: false flat spot
speed climbs 20 fps over the session (most of it in the first 10 shots)*	36%	3%
speed fades 20 fps over the session (most of it in the first 10 shots)*	66%	34%
speed fades 20 fps, faster (most of it in the first 5 shots)	71%	43%

* A one-shot ladder is only ten shots long, so by its last shot it has seen about 59% of that 20 fps drift; the thirty-shot (three-shot-per-rung) ladder sees about 94%.

The settings below are assumed sizes, not measurements:

setting	3 shots: false flat spot	10 shots: false flat spot
speed wanders about 2 fps from rung to rung	12%	0.3%
speed wanders about 4 fps from rung to rung	27%	9%
speed wanders about 6 fps from rung to rung	42%	29%

With no drift, the same settings read 51% (1 shot), 9% (3 shots) and <0.1% (10 shots).