

A PHYSICS PROFESSOR'S VIEW OF BALLISTICS

PART IV

By Bert Blanton

Wind is a significant factor for shooters in Oklahoma where a 10mph wind is a light breeze and 20 mph is a normal day. Wind effect is a much harder topic to understand from a theoretical point of view. Headwinds will slow the bullet down increasing its time in flight. Tailwinds will decrease its time in flight. We have already talked about time in flight effects.

What is the net effect of various bullet parameters on sensitivity to a side wind? The larger calibers and heavier bullets of the same caliber (they are same diameter but are longer) have greater side area than their lighter cousins but have more inertia (resistance to change).

Hornady's ballistics calculator shows that heavy bullets and light bullets of the same caliber, Ballistic Coefficient (BC), and Muzzle Velocity(MV) have exactly the same wind drift.

That same calculator shows a clear improvement in wind drift for a fast bullet (greater MV) of the same caliber, weight, and BC. Below we will look at the same bullet except for BC. Read on.....

How about some actual examples. Here are 2 Federal charts: 1st is a large caliber heavy bullet (500g, .470 cal, 2150 fps) going slow. 2nd is a smaller sized bullet (180g,.30 cal, 300 Win Mag) going much faster (2960). At 400 yds with a 10mph wind the .470 drifts 31", and even the .300 WinMag drifts 12". At 200 yds it is still 7.0" and 2.8" respectively.

More examples from Federal ammo charts (BC unknown):

A .270 Win with 130g Barnes with MV=3050 fps is **2.8"** in 10 mph at **200yds** (about the same as 180g 300WinMag with MV=2960. Not too bad and prob not a MISS. Even a 39g .204Ruger with MV=3750 is **3.3"** in 10mph.

At **200 yds**: 100g Sierra Gameking .243 MV2960 = **2.9"** (going **2533fps@200**). A 100g SP .243 MV2960 = **3.6"** (going **2448@200**). Same weight, same MV, but not same BC. Same size/weight. SP has slowed done more and is displaced by crosswind more. **The bullet with the better BC has less wind drift all other things being equal.**

Last 2 charts below are Hornady calculator runs for same bullet with same BC=0.380 in 10 mph and 20 mph winds. At **200 yards** it drifts **3.2"** in 10 mph and in a 20 mph wind it drifts **6.3"**.

SO: To reduce bullet drop, keep energy up, and crosswind drift down, choose fast calibers with bullets with good BCs! Like a 22-250 or 270 or 243 or 300 WinMag or 7mm08 with low drag bullets and the best powders. But we already knew that, didn't we. Check what the big boys use that they learned from the school of hard knocks.

Load No	Caliber	Grains/ Grams	Bullet Style	Brand	Use
P470T2	470 Nitro Express	500 / 32.4	Trophy Bonded® Sledgehammer® Solid	Cape-Shok®	

Velocity in Feet per Second (To nearest 10 FPS)							
Load No	Caliber	Muzzle	100 Y	200 Y	300 Y	400 Y	500 Y
470T1	470 Nitro Express	2150	1892	1657	1445	1268	1131

Velocity

Wind Drift in Inches (at 10 MPH)						
Load No	Caliber	100 Y	200 Y	300 Y	400 Y	500 Y
P470T1	470 Nitro Express	1.5	7.0	16.4	31.0	50.6

Wind Drift

Load No	Caliber	Grains/ Grams	Bullet Style	Brand	Use
P300WP	300 Win. Magnum	180 / 11.66	Barnes® Triple-Shock® X-Bullet	Vital-Shok®	

Velocity in Feet per Second (To nearest 10 FPS)							
Load No	Caliber	Muzzle	100 Y	200 Y	300 Y	400 Y	500 Y
P300WP	300 Win. Magnum	2960	2752	2554	2364	2182	2009

Velocity

Wind Drift in Inches (at 10 MPH)						
Load No	Caliber	100 Y	200 Y	300 Y	400 Y	500 Y
P300WP	300 Win. Magnum	0.7	2.8	6.3	11.8	19.2

Wind Drift

Input Variables			
Firearm type	Rifle	Sight Height	1.5
Bullet Weight (<i>grains</i>)	130	Ballistic Coefficient	.380
Muzzle Velocity (<i>fps</i>)	3000	Temperature	59
Barometric Pressure	29.53	Relative Humidity	78%

(hg)			
Zero Range (yards)	100	Wind Speed (mph)	10

Ballistics Table in Yards

130 gr., .380 B.C.		www.hornady.com					
Range (yards)	Muzzle	50	100	200	300	400	500
Velocity (fps)	3000	2874	2752	2517	2294	2082	1882
Energy (ft.-lb.)	2598	2384	2186	1828	1519	1251	1022
Trajectory (100 yd. zero)	-1.5	-0.2	0.0	-3.1	-11.6	-26.8	-50.1
Wind Drift (inches)	0.0	0.2	0.7	3.2	7.5	14.1	23.1
Come Up in MOA	-1.5	0.4	0.0	1.5	3.7	6.4	9.6
Wind Drift (moa)	0.00	0.33	0.71	1.51	2.38	3.36	4.42

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Wind Drift (inches)	0.0	0.4	1.5	6.3	15.0	28.1	46.3
Come Up in MOA	-1.5	0.4	0.0	1.5	3.7	6.4	9.6
Wind Drift (moa)	0.00	1.34	2.84	6.04	9.54	13.42	17.68