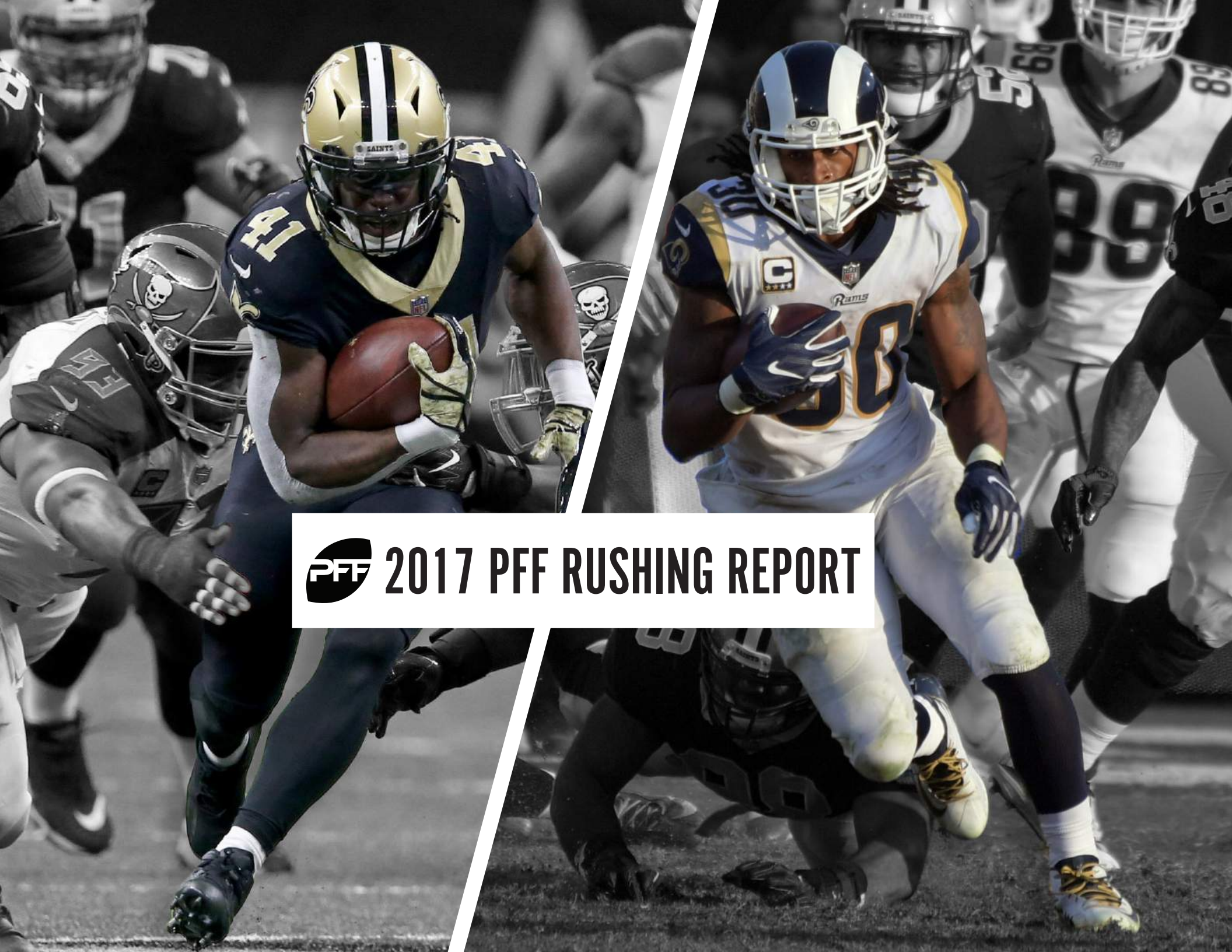

2017 PFF RUSHING REPORT

WELCOME TO PRO FOOTBALL FOCUS' 2017 RUSHING REPORT.

Here, we break down each team's respective successes in each of the six core run-blocking concepts and give an overall scope of each NFL team's ability to force missed tackles and gain yards after contact.

PFF's Eric Eager has also taken the time to dive deeper into our Player Grades and Signature Stats and how they correlate to overall RB and team success rates.

KEY NOTES:

- The attempts factored into PFF's 2017 Rushing Report solely rely on 2017 regular season data and discount attempts nullified by penalty, quarterback kneel downs and quarterback fumbles where play type couldn't be determined.

- Missed Tackles (MTs): The cumulative number of forced missed tackles by the given team's ball carriers during the regular season.

AN ANALYSIS OF PFF SIGNATURE STATS FOR RBS - ERIC EAGER

INTRODUCTION

Pro Football Focus (PFF) grades every player on every play of each NFL game. PFF's grades and metrics attempt to control for the contribution from each member of the offense during a running play, which allows us to better understand how effective a running back is independent of the play of the rest of his offense. One aspect of the PFF product is its Signature Stats - metrics that are not generally available via traditional, box-score statistics. Our five Signature Stats for the running back position are Elusive Rating, Breakaway Percentage, Yards per Route Run, Drop Rate and Pass Blocking Efficiency. In this section we study the stability of these Signature Stats, as well as other PFF-centric statistics, and show how they translate to winning games both in the present and future.

ELUSIVE RATING

Elusive Rating aims at evaluating a running back's success independent of that of his blockers. To compute this metric, PFF charts each time a player with the ball forces a missed tackle in both in the running game and the passing game. For rushing plays, a running back's yards gained before and after first contact are also recorded, with the former thought to be more dependent on external forces than the latter in terms of measuring running back competence. Elusive rating is then computed as

$$100 \times \text{Yards per Carry After Contact} \frac{\text{Missed Tackles Forced as a Rusher and a Receiver}}{\text{Total Touches}}.$$

As a point of reference, 2017's leader in Elusive Rating was New Orleans' rookie running back Alvin Kamara, who posted a 108.5 mark.

BREAKAWAY PERCENTAGE

Breakaway Percentage is the only Signature Stat for running backs that does not require PFF data to compute, as it is simply the percentage of a player's rushing yards that were a result of run of 15 yards or more. 2017's leader in this category was Chicago Bears' rookie runner Tarik Cohen, with 50.3 percent of his rushing yards coming on rushes of 15 yards or more.

YARDS PER ROUTE RUN

One of the backbones of PFF's data collection process is Player Participation, where all 11 players on both sides of the ball are recorded not only for where they line up, but also for the action they perform on a given play. For running backs, we record whether the player ran a pass route or stayed in to block on a pass play, which allows us to measure how efficient he is on a per route (as opposed to a per target) basis. Yards per Route Run is computed exactly how it is as the name suggests, taking the number of a receiving yards a running back generates versus the number of pass routes he runs. Alvin Kamara paced his position group in this metric as well, generating a gaudy 2.81 yards per route run for the Saints.

DROP RATE (DROP)

PFF also charts whether a player drops a catchable pass, and Drop Rate is simply the rate of catchable passes that are dropped by running backs. In 2017, there were only six running backs more than 25 targets that did not drop a pass, while 49ers rookie runner Matt Breida dropped six of 27 catchable passes for the league's highest drop rate (22.22) at his position.

PASS BLOCKING EFFICIENCY

Aside from running the ball and catching passes, running backs have the responsibility to protect the quarterback on some snaps. Pass Blocking Efficiency takes the number of snaps a running back is in pass protection (as charted in Player Participation) and computes a weighted percentage of the number of those snaps where he is responsible for pressure on the quarterback. Pressures and hurries are weighed as three-quarters of a sack in this formula, yielding the ratio

$$100 \times 0.75 \times (\text{Pressures and Hurries Allowed}) + \text{Sacks Allowed} \,.\, \text{Total Pass Blocking Snaps}$$

In 2017, four qualifying running backs had a perfect (100) Pass Blocking Efficiency, giving up zero pressures all season.

TEAM-LEVEL ANALYSES

Our first set of analyses will be at the team level, and how team success at the running back position correlates with in-season wins and predicts wins the following season. In addition to the five Signature Stats for running backs, we computed the yards per carry, both total and after contact, raw PFF rushing, receiving and pass-blocking grades, and the rate of missed tackles forced as a runner and receiver. The resultant correlation coefficients are in Table 1.

$METRIC_N$	$COR(WINS_N)$	$COR(WINS_N+1)$
ELUSIVE RATING	0.074	0.008
BREAKAWAY PERCENTAGE	0.044	-0.079
YARDS PER ROUTE RUN	0.103	0.114
DROP RATE	-0.031	0.023
PASS BLOCKING ECIENCY	0.148	0.146
RAW PFF RUSHING GRADE	0.260	0.059
YARDS PER CARRY	0.210	0.053
YARDS PER CARRY AFTER CONTACT	0.067	-0.030
RUSHING MISSED TACKLE RATE	0.078	0.530
RAW PFF RECEIVING GRADE	0.158	0.099
RECEIVING MISSED TACKLE RATE	0.070	-0.020
RAW PFF PASS-BLOCKING GRADE	0.274	0.191

Table 1: Correlation coecients between team-level running back metrics in season n and wins in season n and n + 1. The higher the (positive) correlation coecient, the stronger the linear relationship is between the two variables.

PLAYER-LEVEL ANALYSES

While team-level trends are illuminating for many metrics, they are reverted to the mean more sub- stantially than at the player level. Additionally, running backs often switch teams, and look- ing at team performance at the position from one season to the next will overlook this dynamic. Thus, it was im- portant for us to look at the individual-player level for insight as well. For each of the Signature Stats we subset the data to contain only players that were over 75 rushing attempts for the rushing metrics, 75 yards in a pass route for the receiving metrics, 25 pass-blocking snaps for the pass-blocking metrics, and more 25 rushes and 10 receptions for the Elusive Rating metric. We determined the stability of this metric season-to-season by computing it's year-to-year correlation between season n and n + 1, as well as its ability to predict yards per carry in season n + 1 (to see if broad running back traits translate to future rushing production). The results are in Table 2.

$METRIC_N$	$COR(METRIC_N+1)$	$COR(YARDS\ PER\ CARRY_N+1)$
ELUSIVE RATING	0.348	0.052
BREAKAWAY PERCENTAGE	0.280	0.138
YARDS PER ROUTE RUN	0.404	N/A
DROP RATE	0.099	N/A
PASS BLOCKING ECIENCY	0.170	N/A
RAW PFF RUSHING GRADE	0.370	0.117
YARDS PER CARRY	0.194	0.194
YARDS PER CARRY AFTER CONTACT	0.250	0.151
RUSHING MISSED TACKLE RATE	0.519	0.064
RAW PFF RECEIVING GRADE	0.360	N/A
RECEIVING MISSED TACKLE RATE	0.211	N/A
RAW PFF PASS-BLOCKING GRADE	0.253	N/A

Table 2: Year-to-year correlations between the team-level metrics studied in Table 1 at the player level. Corre- lation between rushing-centric metrics and subsequent season's yards per rushing attempt were also computed. For rushing metrics we had a sample of 394 back-to-back seasons, 581 for receiving metrics, 528 for pass-blocking metrics and 472 for Elusive Rating.

CONCLUSION

In this paper we explored the statistical properties of PFF's Signature Stats for running backs, and how they compared to traditional statistics like yards per carry and overall team success, both concurrently and predictively. At the team level, we found that metrics in the passing game (raw PFF pass-blocking grade, Pass Blocking Efficiency, Yards per Route Run, raw PFF receiving grade) are more predictive of winning games in subsequent seasons than any of the rushing metrics, adding statistical backing to the charge that teams with running backs that can only run the football will have fleeting offensive success, even if rushing in the now correlates decently with winning (Table 1).

At the player level, we see that traits like forcing missed tackles (in both the running or passing game), generating production as a receiver, protecting the passer and earning yards after contact are all stable skills, with one of the least stable traits (generating yards per carry) able to predict itself better than the other (more stable) metrics. This suggests that we can indeed measure a running back's ability, but a team's ability to generate efficiency in the running game likely has quite a bit to do with the rest of the offense than simply the players carrying the ball.

Given the conclusions above, we're hoping that the trend of acquiring running backs (like Kamara and Cohen) that can provide value in the passing game will be teams' main priority moving forward, leaving rushing efficiency in the hands of circumstance and the skill of the rest of the offense.

	OVERALL				COUNTER		POWER		GAP	
TEAMS	ATTEMPTS	YARDS	YAC	MTs	COUNTER TOTAL	COUNTER YPC	POWER TOTAL	POWER YPC	GAP TOTAL	GAP YPC
ARZ	403	1459	929	46	14	2.5	12	1.7	171	3.9
ATL	429	1928	1245	64	1	5.0	17	3.5	37	2.5
BLT	448	1908	1145	61	34	3.4	84	4.5	38	4.0
BUF	486	2148	1095	58	21	3.2	44	5.2	47	5.0
CAR	479	2154	1198	66	56	3.2	64	4.7	54	4.5
CHI	429	1876	1101	53	24	3.8	27	6.7	14	6.1
CIN	365	1421	865	39	30	5.4	25	4.6	74	3.6
CLV	391	1776	1050	50	13	7.2	37	4.2	35	3.5
DAL	485	2309	1412	60	12	7.9	2	0.0	82	4.0
DEN	462	1952	1180	68	38	4.6	48	5.0	65	3.2
DET	368	1258	903	46	8	1.6	13	4.2	60	2.9
GB	378	1739	942	46	9	4.0	50	4.7	50	4.5
HST	459	1911	1190	41	7	6.1	62	4.6	40	4.6
IND	444	1694	1184	56	13	1.9	13	3.0	55	4.1
JAX	527	2358	1294	70	12	3.0	67	5.2	78	4.5
KC	404	2011	1153	75	29	4.9	53	3.8	27	5.4
LA	441	2036	1101	57	6	0.8	6	2.2	73	3.5
LAC	403	1657	997	60	11	3.3	33	3.9	71	3.5
MIA	362	1479	1254	64	6	5.5	28	3.0	54	5.0
MIN	491	2037	1264	79	9	2.4	36	3.2	102	4.5
NE	449	1960	1168	68	18	4.1	73	4.7	95	4.1
NO	432	2148	1336	61	7	2.6	29	4.9	116	4.3
NYG	395	1596	1000	51	8	3.5	100	5.1	70	2.6
NYJ	429	1805	1052	56	9	2.1	27	4.7	62	3.7
OAK	372	1610	1079	69	14	3.7	23	7.3	69	3.9
PHI	467	2226	1531	81	10	2.0	25	6.2	56	3.7
PIT	425	1753	1112	52	40	5.8	42	3.4	71	3.3
SEA	398	1674	1023	61	4	4.5	7	3.9	53	3.5
SF	410	1734	947	64	14	4.0	20	2.5	19	2.9
TB	394	1538	946	41	19	3.2	35	3.4	46	3.5
TEN	444	1886	1133	72	5	1.8	91	4.5	107	3.6
WAS	400	1535	982	40	29	3.3	34	3.4	79	2.9
NFL AVG	427	1831	1119	59	17	3.8	38	4.1	65	3.9

	OVERALL				INSIDE ZONE		OUTSIDE ZONE		TRAP	
TEAMS	ATTEMPTS	YARDS	YAC	MTs	INSIDE ZONE TOTAL	INSIDE ZONE YPC	OUTSIDE ZONE TOTAL	OUTSIDE ZONE YPC	TRAP TOTAL	TRAP YPC
ARZ	403	1459	929	46	118	3.6	44	1.6	2	6.0
ATL	429	1928	1245	64	115	4.4	219	4.5	0	0.0
BLT	448	1908	1145	61	87	4.0	130	3.9	25	6.4
BUF	486	2148	1095	58	105	3.8	187	3.9	3	1.0
CAR	479	2154	1198	66	110	5.3	87	2.7	6	3.5
CHI	429	1876	1101	53	145	3.9	165	3.8	7	1.9
CIN	365	1421	865	39	73	3.5	122	3.2	3	4.3
CLV	391	1776	1050	50	130	4.5	85	3.3	1	5.0
DAL	485	2309	1412	60	125	4.6	198	4.4	5	9.4
DEN	462	1952	1180	68	135	4.2	88	3.2	10	6.8
DET	368	1258	903	46	95	3.2	135	3.5	14	4.0
GB	378	1739	942	46	95	4.3	107	3.3	7	8.1
HST	459	1911	1190	41	147	4.2	136	2.5	3	3.0
IND	444	1694	1184	56	176	4.0	124	3.0	5	4.6
JAX	527	2358	1294	70	215	4.2	110	3.3	1	1.0
KC	404	2011	1153	75	72	2.9	156	5.3	8	3.8
LA	441	2036	1101	57	132	4.2	169	5.4	14	5.1
LAC	403	1657	997	60	73	3.6	139	4.2	22	7.1
MIA	362	1479	1254	64	124	4.3	113	3.7	10	4.6
MIN	491	2037	1264	79	187	3.7	107	4.7	3	4.7
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