## Rethinking 2 Point Conversions and 4<sup>th</sup> & Short

Patrick Walsh April 2020



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## Overview

- 2 Point Attempts
- 4<sup>th</sup> Down Attempts
- Takeaways



### **Presentation Overview**

- This presentation was designed to further explore NFL Data while honing my skills in SQL, Tableau, and Excel
- The findings are useful for NFL coaches, sports journalists, fans, and others looking to research NFL data
- The data was compiled by a group of Carnegie Mellon researchers and is available on Kaggle<sup>1</sup>



## **Experimental Procedure**

#### <u>Questions</u>

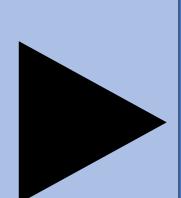
 Are teams becoming more aggressive on 4th and short & in 2 point conversion situations?

 What are the play call tendencies in these situations? Has it changed over time? Does the situation in the game influence it?

 Is there a more successful play type in these short yardage situations?

#### <u>Analysis</u>

- Time series analysis of attempts by season and as a % of total opportunities (2 point attempts/touchdowns, & 4th down attempts/total 4th and short opportunities)
- High level breakdown of pass/run frequency and conversion in each situation, followed by deep dive factoring game-state pressure1 and field position2



#### **Findings**

- 2018 2 point conversion attempts are 2.28x that of the 2009-2014 average, and 1.49x the 2015-2017 average
- 4th and short was attempted more often in 2018 despite fewer opportunities
- Passes are heavily favored (75%) in 2 point conversion and 4th and 2 situations, runs in 4th and 1 situations (73%)
- Increased pressure leads to higher likelihood of passing
- Runs are more effective on all play calls, yet are called far less often than pass plays on 4th and 2 and 2 point conversions



## Definitions

### Play Type/Play Call - Run or Pass

<u>Play Type Frequency – Number of times a play was called out of all attempts in a given situation (stated as a rate or % – i.e. pass plays had a frequency of .7 or 70%)</u>

<u>Total Opportunities/Instances –</u> Total number of times given situation occurs (1000 would indicate there were 1000 plays in which the offense faced a 4<sup>th</sup> and 1), or the sum of attempts and non-attempts

<u>Conversion Rate – The number of successful attempts/total attempts</u>

<u>Growth Rate/% Growth – (Current Period – Previous Period)/Previous Period</u>

<u>Pressure<sup>1</sup> – An assigned value (low, medium, high) accounting for the score differential and quarter in the game (A team trailing by 10 in the 2<sup>nd</sup> quarter would be in a **medium pressure situation**, whereas a team trailing by 5 in the 4<sup>th</sup> quarter would be in a **high pressure situation**</u>

<u>Opp</u> – Opponent's side of the field (within 50 yards of the endzone)

<u>Scramble<sup>2</sup> – A called pass play in which the quarterback decides to run the ball after the play breaks down</u>

<u>PAT – Point after touchdown</u>



## Contents

## Overview

2 Point Attempts

4<sup>th</sup> Down Attempts

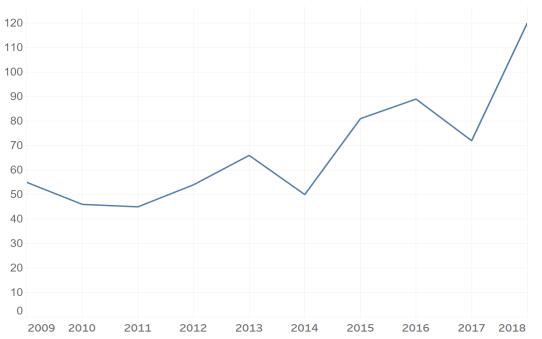
Takeaways



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# The number of 2 point conversion attempts is rapidly increasing, and 120 attempts in 2018 is double that of the average attempts prior to 2015

2 Point Attempts by Season



2 Point Attempts – Ratio Analysis

2 Point Attempts	2009-2014 (Average)	2015-2017 (Average)	2018	2018 % Growth
# of Attempts	52.67	80.67	120.00	48.76%
Touchdowns	1281.33	1275.67	1279.00	0.26%
Attempts as a % of Touchdowns	4.11%	6.32%	9.38%	48.37%
Attempts per Team	1.65	2.52	3.75	48.76%

Excludes touchdowns scored in overtime as these conclude the game and no PAT is attempted

Changes in rules (moving back the PAT kick in 2015) was a catalyst for the initial surge in attempts, and teams have seemed willing to further experiment in the subsequent years

Data shows surge in attempts is not tied to an increase in the # of opportunities (touchdowns), rather more willingness to go for 2

2 Point conversions attempts have skyrocketed, and on average, teams will face a total of 4.2 more attempts per 16 game regular season than in the years prior to 2015 (2.1 offensively, 2.1 defensively)

Appendix Exhibit 4 (2 Point Conversion Ratios)

# There was growth in 2 point attempts throughout all situations in a game, though low and medium pressure<sup>1</sup> situations saw the highest % change in 2018

### 2 Point Attempts Over Time – By Pressure

2 Point Attempts		)09-20 Average		2015-2017 (Average)			20	18 Valı	les	2018 % Growth (From 2015-2017)		
Pressure	L	Μ	Н	L	Μ	Н	L	Μ	Н	L	Μ	Н
# of Attempts	2.67	6.67	43.33	7.00	17.33	56.33	17.00	28.00	75.00	142.86%	61.54%	33.14%
Touchdowns	540.00 407.33 334.00		512.00 416.33 347.33		556.00 379.00 344.00		344.00	8.59% -8.97%		-0.96%		
Attempts Per TD by Pressure	0.49%	1.68%	13.04%	1.37%	4.16%	16.22%	3.06%	7.39%	21.80%	123.64%	77.45%	34.43%
Total Attempts Per TD 4.11%				6.32%			9.38%		48.76%			
% Growth from Previous Period				53.84%					48.	37%		

L = Low Pressure

M = Medium Pressure

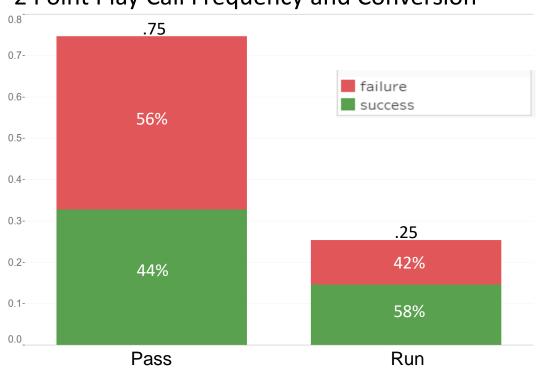
H = High Pressure

The dramatic uptick in attempts during **low and medium pressure situations** implies the growth is primarily driven by **more aggressive play-calling early in games** (going for it when not necessary to catch-up or build a lead) and not a product of the "need" to go for 2 point conversions in close games



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# There is an overwhelming tendency to throw the ball when attempting a 2 point conversion despite a glaring difference in the conversion rate of each play type



2 Point Play Call Frequency and Conversion

2 Point Attempts – Team Breakdown

Teams P	Pass - Fail P	ass - Success	Total Passes	Run - Fail	Run - Success	Total Runs	Total Attempts	% Passes	% Runs	Pass Success (%)	Run Success (%)	Total Succes
CHI	5	15	20	2	6	8	28	71%	29%	75%	75%	75%
LAC	5	8	13	0	2	2	15	87%	13%	62%	100%	67%
PHI	7	7	14	2	10	12	26	54%	46%	50%	83%	65%
LA	3	9	12	5	5	10	22	55%	45%	75%	50%	64%
NYG	6	2	8	1	10	11	19	42%	58%	25%	91%	63%
PIT	13	19	32	1	3	4	36	89%	11%	59%	75%	61%
MIN	6	7	13	2	5	7	20	65%	35%	54%	71%	60%
BAL	6	6	12	2	4	6	18	67%	33%	50%	67%	56%
BUF	7	6	13	3	6	9	22	59%	41%	46%	67%	55%
OAK	8	10	18	1	0	1	19	95%	5%	56%	0%	53%
NO	6	3	9	4	8	12	21	43%	57%	33%	67%	52%
HOU	5	3	8	1	3	4	12	67%	33%	38%	75%	50%
MIA	7	5	12	1	3	4	16	75%	25%	42%	75%	50%
IND	11	9	20	2	4	6	26	77%	23%	45%	67%	50%
NE	6	5	11	1	2	3	14	79%	21%	45%	67%	50%
DAL	7	6	13	1	2	3	16	81%	19%	46%	67%	50%
CAR	9	8	17	1	1	2	19	89%	11%	47%	50%	47%
SF	4	4	8	2	1	3	11	73%	27%	50%	33%	45%
CIN	8	3	11	0	3	3	14	79%	21%	27%	100%	43%
CLE	12	7	19	3	4	7	26	73%	27%	37%	57%	42%
WAS	10	8	18	4	2	6	24	75%	25%	44%	33%	42%
JAX	13	8	21	3	3	6	27	78%	22%	38%	50%	41%
GB	14	10	24	2	1	3	27	89%	11%	42%	33%	41%
DEN	6	5	11	7	3	10	21	52%	48%	45%	30%	38%
SEA	11	6	17	1	1	2	19	89%	11%	35%	50%	37%
ATL	12	8	20	4	1	5	25	80%	20%	40%	20%	36%
ARI	10	5	15	3	2	5	20	75%	25%	33%	40%	35%
DET	18	11	29	5	0	5	34	85%	15%	38%	0%	32%
ТВ	18	9	27	6	2	8	35	77%	23%	33%	25%	31%
TEN	9	4	13	2	1	3	16	81%	19%	31%	33%	31%
NYJ	12	2	14	0	2	2	16	88%	13%	14%	100%	25%
KC	10	3	13	1	0	1	14	93%	7%	23%	0%	21%
Totals	284	221	505	73	100	173	678	74%	26%	44%	58%	47%

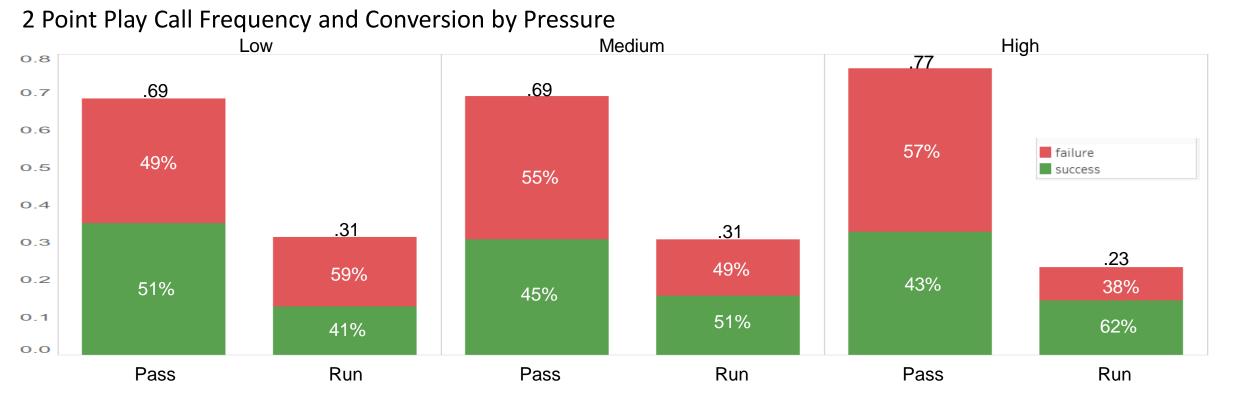
Pass plays account for 75% of all 2 point conversion attempts, yet they are not nearly as successful as run plays (44% vs. 58% conversion)

Only 2 teams rushed the ball more than 50% of the time, indicating the distribution of pass/run is a league-wide preference, making game planning for these situations a bit easier

This figure can **potentially slightly underestimate the pass total** as not all QB runs could be confirmed as scrambles or designed runs<sup>1</sup>

Appendix Exhibit 3 (2 Point Conversion Attempts) 1- Appendix Exhibit 13 (QB Runs on 2 Point Conversions)

# An analysis revealed that the 2 point attempt pass/rush play call frequency and effectiveness vary given the pressure of the situation in the game



The disparity between pass and run play calls grows as the pressure mounts from low to high (pass frequency increases from 69% to 77%), but the effectiveness of passes decreases (51% to 43%) while the effectiveness of runs increases with pressure (41% to 62%)

Teams are adamant to place the ball in their quarterback's hands in crucial situations despite lower conversion



Appendix Exhibit 3 (2 Point Conversion Attempts)

## Contents

## Overview

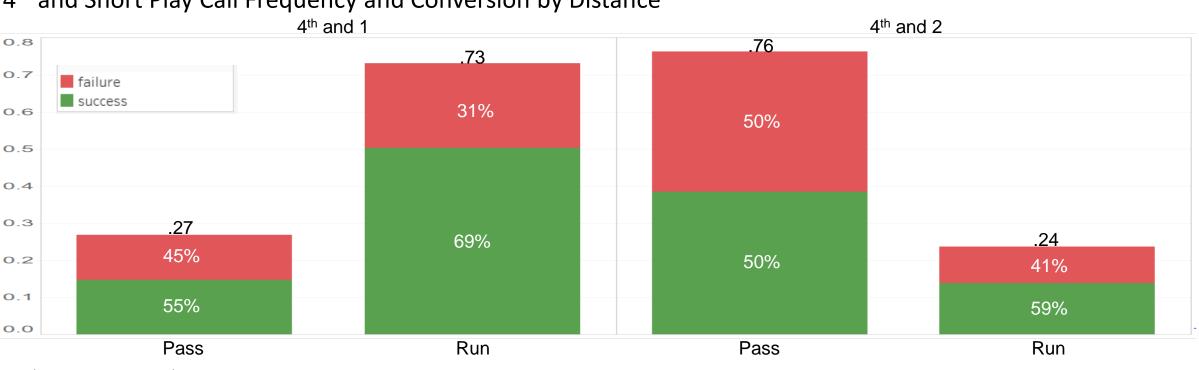
2 Point Attempts

4<sup>th</sup> Down Attempts

Takeaways



## Analysis revealed a staggering difference in play calling tendencies and effectiveness on 4<sup>th</sup> and 1 vs. 4<sup>th</sup> and 2 situations



4<sup>th</sup> and Short Play Call Frequency and Conversion by Distance

1779 4<sup>th</sup> and 1 attempts & 541 4<sup>th</sup> and 2 attempts

On 4<sup>th</sup> and 1, 73% of attempts were **rushes**, converting 69% of the time (passes had a 55% conversion) On 4<sup>th</sup> and 2, **passes** accounted for 76% of play calls, converting 50% of the time (runs converted 59%) Key Takeaway – 1 yard makes all the difference in play calling – but why?

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Appendix Exhibits 5 & 6 (4th and Short Attempts)

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# League-wide totals were broken down by team to better understand the distribution of pass/run plays and to identify potential outliers

Teams	Pass - Fail	Pass - Success	Total Passes	Run - Fail	Run - Success	Total Runs	Total Attempts	% Passes	% Runs	Pass Success (%)	Run Success (%)	Total Success
ARI	3	7	10	6	23	29	39	26%	74%	70%	79%	77%
CAR	6	8	14	8	35	43	57	25%	75%	57%	81%	75%
CLE	7	5	12	8	34	42	54	22%	78%	42%	81%	72%
NYJ	1	7	8	14	32	46	54	15%	85%	88%	70%	72%
TEN	4	14	18	11	23	34	52	35%	65%	78%	68%	71%
PHI	7	11	18	18	49	67	85	21%	79%	61%	73%	71%
SEA	7	6	13	7	27	34	47	28%	72%	46%	79%	70%
CIN	4	4	8	14	38	52	60	13%	87%	50%	73%	70%
DAL	3	5	8	15	36	51	59	14%	86%	63%	71%	69%
NO	6	8	14	15	39	54	68	21%	79%	57%	72%	69%
NE	6	10	16	15	36	51	67	24%	76%	63%	71%	69%
KC	5	8	13	14	31	45	58	22%	78%	62%	69%	67%
SF	7	12	19	13	29	42	61	31%	69%	63%	69%	67%
DEN	7	13	20	11	22	33	53	38%	62%	65%	67%	66%
MIN	5	11	16	13	24	37	53	30%	70%	69%	65%	66%
CHI	6	8	14	12	27	39	53	26%	74%	57%	69%	66%
PIT	4	12	16	13	21	34	50	32%	68%	75%	62%	66%
LA	9	11	20	10	24	34	54	37%	63%	55%	71%	65%
HOU	5	14	19	18	27	45	64	30%	70%	74%	60%	64%
BAL	6	8	14	18	34	52	66	21%	79%	57%	65%	64%
JAX	12	5	17	16	43	59	76	22%	78%	29%	73%	63%
BUF	7	3	10	9	23	32	42	24%	76%	30%	72%	62%
LAC	2	4	6	14	22	36	42	14%	86%	67%	61%	62%
TB	7	7	14	15	26	41	55	25%	75%	50%	63%	60%
WAS	10	8	18	11	22	33	51	35%	65%	44%	67%	59%
OAK	9	9	18	15	24	39	57	32%	68%	50%	62%	58%
ATL	14	8	22	11	25	36	58	38%	62%	36%	69%	57%
GB	8	8	16	14	21	35	51	31%	69%	50%	60%	57%
DET	12	5	17	11	24	35	52	33%	67%	29%	69%	56%
MIA	7	4	11	16	25	41	52	21%	79%	36%	61%	56%
NYG	7	7	14	13	16	29	43	33%	67%	50%	55%	53%
IND	12	12	24	10	13	23	47	51%	49%	50%	57%	53%
rand Total	215	262	477	408	895	1302	1779	27%	73%	55%	. 69%	65%

#### 4<sup>th</sup> and 1 Attempts – Team Breakdown

### 4<sup>th</sup> and 2 Attempts – Team Breakdown

Teams	Pass - Fail	Pass - Success	Total Passes	Run - Fail	Run - Success	Total Runs	Total Attempts	% Passes	% Runs	Pass Success (%)	Run Success (%)	Total Success
DET	5	9	14	0	6	6	20	70%	30%	64%	100%	75%
CIN	3	6	9	1	5	6	15	60%	40%	67%	83%	73%
PIT	1	7	8	2	0	2	10	80%	20%	88%	0%	70%
ATL	5	14	19	1	0	1	20	95%	5%	74%	0%	70%
NO	4	12	16	3	4	7	23	70%	30%	75%	57%	70%
IND	2	5	7	2	3	5	12	58%	42%	71%	60%	67%
LAC	3	7	10	2	3	5	15	67%	33%	70%	60%	67%
LA	2	5	7	1	1	2	9	78%	22%	71%	50%	67%
CAR	3	8	11	3	2	5	16	69%	31%	73%	40%	63%
NE	4	8	12	1	0	1	13	92%	8%	67%	0%	62%
MIA	6	7	13	0	1	1	14	93%	7%	54%	100%	57%
DEN	6	6	12	2	4	6	18	67%	33%	50%	67%	56%
PHI	6	7	13	2	3	5	18	72%	28%	54%	60%	56%
SF	6	8	14	2	2	4	18	78%	22%	57%	50%	56%
CLE	6	10	16	3	1	4	20	80%	20%	63%	25%	55%
BAL	8	8	16	2	3	5	21	76%	24%	50%	60%	52%
NYG	10	13	23	2	0	2	25	92%	8%	57%	0%	52%
TEN	7	4	11	1	4	5	16	69%	31%	36%	80%	50%
NYJ	4	6	10	2	0	2	12	83%	17%	60%	0%	50%
DAL	7	5	12	0	2	2	14	86%	14%	42%	100%	50%
MIN	8	5	13	0	2	2	15	87%	13%	38%	100%	47%
TB	8	5	13	0	2	2	15	87%	13%	38%	100%	47%
ARI	11	5	16	0	4	4	20	80%	20%	31%	100%	45%
KC	9	4	13	1	4	5	18	72%	28%	31%	80%	44%
WAS	12	10	22	3	1	4	26	85%	15%	45%	25%	42%
HOU	7	4	11	3	3	6	17	65%	35%	36%	50%	41%
JAX	7	1	8	1	4	5	13	62%	38%	13%	80%	38%
CHI	7	5	12	1	0	1	13	92%	8%	42%	0%	38%
GB	9	2	11	4	5	9	20	55%	45%	18%	56%	35%
BUF	12	7	19	3	1	4	23	83%	17%	37%	25%	35%
SEA	8	2	10	2	3	5	15	67%	33%	20%	60%	33%
OAK	9	3	12	3	2	5	17	71%	29%	25%	40%	29%
Grand Total	205	208	413	53	75	128	541	76%	24%	50%	59%	52%

Only one team passed on the majority of their 4<sup>th</sup> and 1 attempts (Colts passed 51% of the time, and they had the worst conversion rate), indicating a league-wide preference to run the ball in this situation (76% of all attempts)

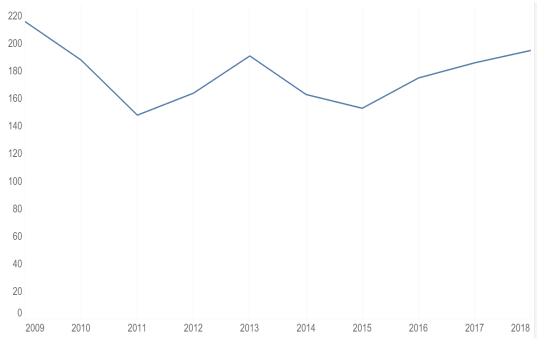
No teams ran the ball more than 50% of the time on  $4^{th}$  and 2

Teams can better prepare for these situations in the beginning of the season knowing the league-wide preference in play call

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# Though the total number of 4<sup>th</sup> and 1 attempts showed no clear trend, there was a noticeable increase in attempts as a % of total opportunities in 2018

4<sup>th</sup> and 1 Attempts by Season



League-wide data (1779 attempts)

4<sup>th</sup> and 1 Attempts – Ratio Analysis

4 <sup>th</sup> and 1 Attempts	2009-2017 (Average)	2018	2018 % Growth	FY
# of Attempts	176.00	195.00	10.80%	234.19
Total Opportunities	420.33	350.00	-16.73%	420.33
Attempts per Opportunity	41.87%	55.71%	33.06%	55.71%
Attempts per Team	5.50	6.09	10.80%	7.32

Total Opportunities = Total Number of  $4^{th}$  and 1 situations FY = Forward Year Estimate

A stark increase in the attempts per opportunity indicates more aggressive play calling and/or more critical situations on 4<sup>th</sup> and 1

If the 2018 rate were to stay constant, and if total opportunities returns to the average amount, it is fair to expect an increase of nearly 40 attempts in a given year

Key Takeaway - 4<sup>th</sup> and 1 situations will become increasingly important for defenses to prepare for, and teams will likely face 3.64 more attempts on average (1.82 offensively, 1.82 defensively) per 16 game season than in the previous 9 years Appendix Exhibit 11 (4th and 1 by Pressure and Field Position Over Time)

# A deeper dive revealed changes in willingness to attempt 4<sup>th</sup> and 1 opportunities given the pressure of the situation and the position on the field

4<sup>th</sup> and 1 Attempts as a % of Total Opportunities – by Pressure and Field Position

4th and 1	2	009-2017	Avera	ge		2018 Va	alues		2018 % Change from Average				
<u>411 anu 1</u>	Low	Medium	High	Total	Low	Medium	High	Total	Low	Medium	High	Total	
Inside own 40	4.60%	4.20%	27.19%	10.73%	7.69%	5.88%	33.33%	15.09%	67.40%	40.14%	22.59%	40.68%	
Own 40-49	16.88%	17.74%	51.72%	27.41%	28.00%	42.86%	63.64%	40.00%	65.85%	141.56%	23.03%	45.93%	
Opp 41-50	50.00%	52.21%	70.09%	56.64%	84.62%	95.00%	87.50%	90.24%	69.23%	81.97%	24.85%	59.32%	
Орр 31-40	80.67%	82.31%	84.75%	82.56%	77.78%	85.71%	75.00%	78.57%	-3.59%	4.14%	-11.50%	-4.83%	
Орр 21-30	68.47%	52.68%	75.00%	64.89%	63.64%	87.50%	75.00%	74.07%	-7.06%	66.10%	0.00%	14.15%	
Opp 11-20	47.96%	51.96%	59.78%	53.08%	66.67%	85.71%	60.00%	71.05%	39.01%	64.96%	0.36%	33.85%	
Opp 1-10	65.16%	59.81%	69.79%	64.79%	86.67%	92.00%	85.00%	88.33%	33.01%	53.82%	21.79%	36.34%	
Total	35.86%	36.33%	55.63%	41.87%	44.63%	61.48%	61.68%	55.71%	24.44%	69.22%	10.89%	33.06%	

Opp = Opponent's side of the field

Appendix Exhibit 7 (Pressure and Field Position Analysis)

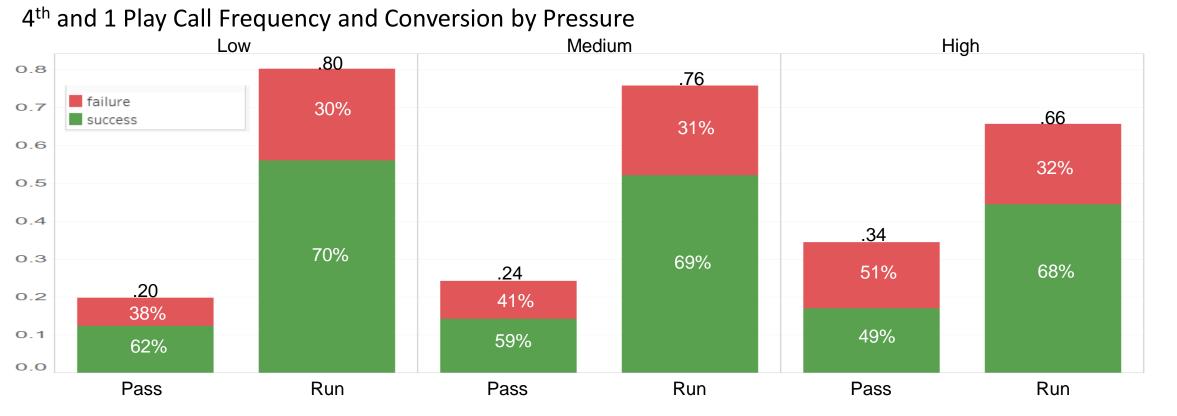
Team's willingness to attempt a 4<sup>th</sup> and 1 has increased at almost all points on the field with the **biggest spike between the 40s** (intuitively, this makes sense, as this is too far to kick a field goal, and punts will net fewer yards when kicked from here)

When considering pressure, the largest % changes occurred in medium and low pressure situations (69% and 24% increase from average), indicating the increase in relative attempts is the result of more aggressive play calling and not due to a close game

Teams need to prepare to defend against 4<sup>th</sup> and 1, as it is becoming increasingly common to go for it, especially around mid field Appendix Exhibit 11 (4th and 1 by Pressure and Field Position Over Time)



# Like 2 point conversions, pressure is a large influencer on play call tendencies and conversion rate for 4<sup>th</sup> and 1 situations



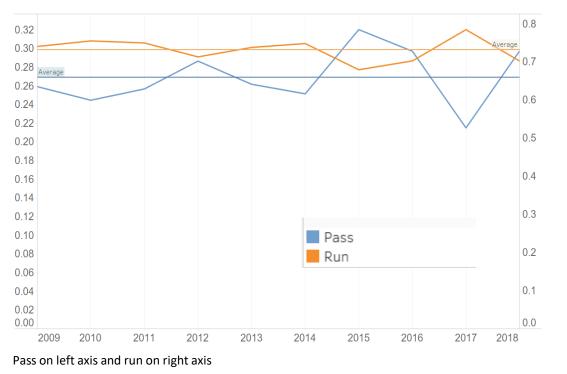
Play calls greatly shift with pressure (80%-20% run/pass when low vs. 66%-34% run/pass when high) Pass conversion seems to be more influenced by pressure (62% to 50% for passes, 70% to 68% for runs) **Teams should be more confident in running the ball – especially in crucial situations** 



Appendix Exhibit 5 (4<sup>th</sup> and 1 attempts)

# The ratio of pass to run plays has remained fairly steady over 10 years with a slight increase in the relative number of pass plays in recent years

4<sup>th</sup> and 1 Play Call Frequency by Season



4<sup>th</sup> and 1 Attempts – Conversion over time

4 <sup>th</sup> and 1 Attempts	2009-2017 (Average)	2018	2018 % Growth
% Pass Attempts	26.45%	29.76%	12.44%
% Run Attempts	73.55%	70.24%	-4.48%
Pass Conversion	53.94%	62.07%	15.07%
Run Conversion	67.81%	76.64%	13.02%

In 2018, the split of **runs to passes** was 70%-30% indicating a shift towards passes relative to the 9 year average of 74%-26%

Interestingly, the conversion rate of each play type is at a 10-year high (77% for runs vs. 68% 10 year average, and 62% for passes vs. 54% 10 year average)

Teams are becoming more successful in 4<sup>th</sup> and 1 situations and should continue to increase aggression



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# Total 4<sup>th</sup> and 2 attempts has been slowly rising since 2014, and there was a nontrivial increase in attempts as a % of total opportunities in 2018

4<sup>th</sup> and 2 Attempts by Season



League-wide data (541 attempts)

4<sup>th</sup> and 2 Attempts – Ratio Analysis

4 <sup>th</sup> and 2 Attempts	2009-2017 (Average)	2018	2018 % Growth	FY
# of Attempts	53.22	62.00	16.49%	79.22
Total Opportunities	299.00	234.00	-21.74%	420.33
Attempts per Opportunity	17.80%	26.50%	48.85%	26.50%
Attempts per Team	1.66	1.94	16.49%	2.48

Total Opportunities = Total Number of  $4^{th}$  and 2 situations FY = Forward Year Estimate

Despite 22% fewer 4<sup>th</sup> and 2 opportunities, the total attempts rose 16% and attempts per opportunity rose nearly 49%, signaling more aggressive play calling and/or more critical situations when a team faced 4<sup>th</sup> and 2

If the 2018 rate stays constant, and if total opportunities returns to average, it is fair to expect an increase of 17 attempts in a given year

Key Takeaway - 4<sup>th</sup> and 2 situations are attempted more frequently now, and teams will likely face this situation on average **4.96** times a year (half offensively, half defensively), 49% more frequently than the 9 year average of **3.33** times a year Appendix Exhibit 12 (4th and 2 by Pressure and Field Position Over Time)

# A deeper dive revealed changes in willingness to attempt 4<sup>th</sup> and 2 opportunities given the pressure of the situation and the position on the field

4<sup>th</sup> and 2 Attempts as a % of Total Opportunities – by Pressure and Field Position

1th and 2	2	009-2017	Avera	ge		2018 Va	alues		2018 % Change from Average				
<u>4th and 2</u>	Low	Medium	High	Total	Low	Medium	High	Total	Low	Medium	High	Total	
Inside own 40	0.30%	2.03%	16.88%	5.39%	2.63%	6.90%	35.71%	9.88%	763.16%	239.08%	111.54%	83.36%	
Own 40-49	3.01%	6.99%	24.78%	10.19%	0.00%	11.11%	60.00%	20.00%	-100.00%	58.89%	142.14%	96.28%	
Opp 41-50	12.22%	16.19%	50.60%	25.18%	33.33%	50.00%	80.00%	52.17%	172.73%	208.82%	58.10%	107.20%	
Opp 31-40	40.74%	51.81%	60.47%	51.20%	85.71%	0.00%	72.73%	66.67%	110.39%	-100.00%	20.28%	30.21%	
Opp 21-30	24.73%	12.50%	34.67%	24.17%	0.00%	9.09%	71.43%	26.09%	-100.00%	-27.27%	106.04%	7.95%	
Opp 11-20	8.43%	14.08%	34.18%	18.88%	0.00%	50.00%	75.00%	41.18%	-100.00%	255.00%	119.44%	118.05%	
Opp 1-10	7.91%	14.50%	41.67%	21.74%	16.67%	15.79%	44.44%	23.53%	110.61%	8.86%	6.67%	8.24%	
Total	9.29%	12.67%	33.79%	17.80%	12.05%	18.68%	58.33%	26.50%	29.75%	47.48%	72.66%	48.85%	

Opp = Opponent's side of the field

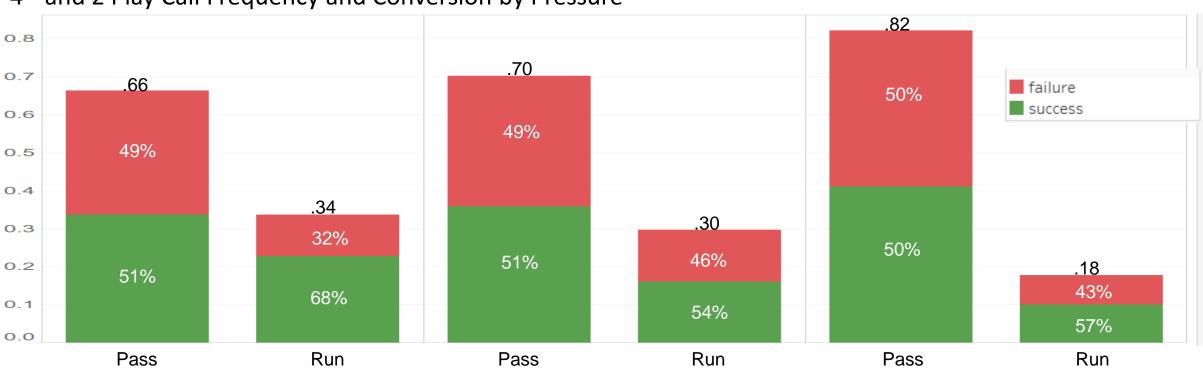
Team's willingness to attempt a 4<sup>th</sup> and 2 has increased at all points on the field, and on the aggregate, in all situations in the game

When considering pressure, the largest % changes occurred in high and medium pressure situations (73% and 47% increase from 9 year average), indicating the increase in relative attempts is the result of more aggressive play calling in crunch time

#### Defenses should take note as coaches are showing more confidence on 4<sup>th</sup> and 2, especially In higher stakes situations



# Pressure creates the largest disparity in play type frequency but has less influence on the conversion of play types in 4<sup>th</sup> and 2 situations



4<sup>th</sup> and 2 Play Call Frequency and Conversion by Pressure

Passes are overwhelmingly preferred with increased pressure (66%-34% pass/run split when low vs. 82%-18% when high)

Though runs become less effective with pressure on 4<sup>th</sup> and 2, **pass conversion seems to not be greatly influenced**, and the relationship is less clear (51% to 50% pass conversion when pressure is low vs. high, and 68% to 57% run conversion)

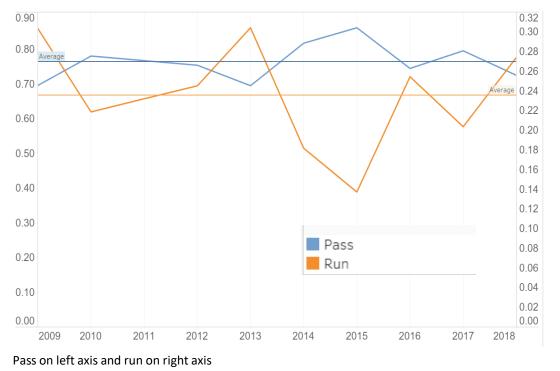
Teams are leaning heavily on passing the ball (perhaps too much, and telegraphing their decision in high pressure situations), yet runs are still a very viable and underutilized option in this situation and should be used more often Appendix Exhibit 6 (4th and 2 Attempts)



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# While difficult to identify a clear trend over the past 10 years, passes have accounted for ¾ of all attempts over the past 10 years on 4<sup>th</sup> and 2

4<sup>th</sup> and 2 Play Call Frequency by Season



4<sup>th</sup> and 2 Attempts – Conversion over time

4 <sup>th</sup> and 2 Attempts	2009-2017 (Average)	2018	2018 % Growth
% Pass Attempts	76.78%	73.77%	-5.53%
% Run Attempts	23.28%	26.23%	18.32%
Pass Conversion	49.18%	60.00%	21.99%
Run Conversion	57.66%	64.71%	12.22%

In 2018, the split of passes to runs was 74%-26% with a 9 year average of 77%-23% (fairly steady)

The effectiveness of both runs and passes has risen substantially above their 10 year averages (60% conversion for passes in 2018 vs 49% average, and 65% for runs vs. 58% average)

Teams are becoming more successful in 4<sup>th</sup> and 2 situations and should look to be more aggressive

Appendix Exhibit 8 (4th and 2 Over Time)

## Contents

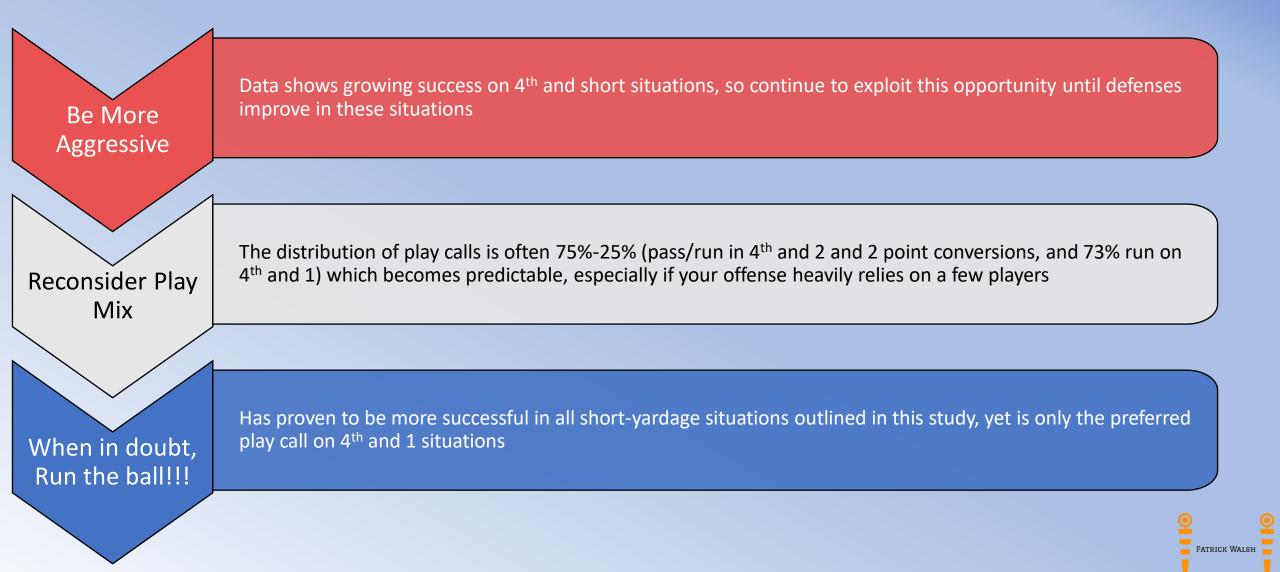
## Overview

- 2 Point Attempts
- 4<sup>th</sup> Down Attempts

Takeaways



## Offensive coaches should alter their approach to short yardage situations



## Defensive coaches should leverage data to prepare for short yardage situations

### 2 Point & 4<sup>th</sup> and short attempts will become increasingly important

Attempts have skyrocketed recently on a % basis and totals will rise in the future, so this play should be a bigger part in game plans

Identify opposing team's tendencies

These are not coin-flip scenarios, data suggests the offensive team will heavily favor a play call in these situations

#### Reconsider personnel and schematic approach for these situations

An optimal roster can be built to defend in these situations, and defensive alignment and play calling can be enhanced for these scenarios (more data can be useful here – i.e "4-man front, B-gap blitz, other schemes that prove effective against these plays)

## **Potential Next Steps**

- The procedure and findings serve to guide further analysis to reveal additional insight (either league-wide or team-specific)
- Analysis such as player utilization, route distance, preferred side to target with the ball (right/left/middle) can all be performed (both in and outside of these short yardage situations)
- Happy to follow up with more information

## Email: patjwalsh35@gmail.com



## Appendix



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### Data

### Exhibit 1 – Kaggle Data



The data can be found at (<u>https://www.kaggle.com/maxhorowitz/nflplaybyplay2009to2016</u>) The data has been updated since its creation to include 2017 and 2018 values

## Started with a dataset of 255 columns and 450k rows and multiple questions to explore

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1	2458	2009092001	DET	MIN	DET	home	MIN	DET	66	2009-09-20 00:00:00.000	348	1248	1248	Half2	0	15
2	2482	2009092001	DET	MIN	DET	home	MIN	DET	58	2009-09-20 00:00:00.000	307	1207	1207	Half2	0	15
3	2507	2009092001	DET	MIN	MIN	away	DET	MIN	71	2009-09-20 00:00:00.000	293	1193	1193	Half2	0	16
4	2528	2009092001	DET	MIN	MIN	away	DET	MIN	71	2009-09-20 00:00:00.000	259	1159	1159	Half2	0	16
5	2552	2009092001	DET	MIN	MIN	away	DET	MIN	74	2009-09-20 00:00:00.000	216	1116	1116	Half2	0	16
6	2571	2009092001	DET	MIN	MIN	away	DET	MIN	80	2009-09-20 00:00:00.000	192	1092	1092	Half2	0	16
7	2594	2009092001	DET	MIN	DET	home	MIN	DET	63	2009-09-20 00:00:00.000	183	1083	1083	Half2	0	17
8	2615	2009092001	DET	MIN	DET	home	MIN	DET	56	2009-09-20 00:00:00.000	149	1049	1049	Half2	0	17
9	2636	2009092001	DET	MIN	DET	home	MIN	DET	51	2009-09-20 00:00:00.000	115	1015	1015	Half2	0	17
10	2660	2009092001	DET	MIN	DET	home	MIN	MIN	43	2009-09-20 00:00:00.000	91	991	991	Half2	0	17
11	2681	2009092001	DET	MIN	DET	home	MIN	MIN	42	2009-09-20 00:00:00.000	55	955	955	Half2	0	17
12	2703	2009092001	DET	MIN	DET	home	MIN	MIN	42	2009-09-20 00:00:00.000		949	949	Half2	0	17
13	2730	2009092001	DET	MIN	MIN	away	DET	MIN	83	2009-09-20 00:00:00.000		941	941	Half2	0	18
14	2754	2009092001	DET	MIN	NA	NA	NA	MIN	NULL	2009-09-20 00:00:00.000	-	900	900	Half2	1	18
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PATRICK WALSH

## After narrowing the focus to a few experimental questions worth exploring, the dataset was queried and prepared for analysis

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919     Hal2     0     18     0     3     NULL     0     1899-12-30 00-190.0000     JAC 2     0     80     TWO-POINT CONVERSION ATTEMPT. K.Collina pass to A.C     pass     0     0       328     Hal72     0     22     1     4     NULL     0     1899-12-30 052 00000     JAC 2     0     77     TWO-POINT CONVERSION ATTEMPT. K.Collina pass to A.C     pass     0     0       326     Hal72     0     17     0     4     NULL     0     1899-12-30 052 00000     VAS 2     0     85     TWO-POINT CONVERSION ATTEMPT. K.Collina pass to A.C     pass     0     0       554     Hal72     0     18     1     4     NULL     0     1899-12-30 052 00000     VHX 2     0     85     (Pass formation) TWO-POINT CONVERSION ATTEMPT. C.P     pass     0     0       200     Hal7     0     18     1     4     NULL     0     1899-12-30 01140 0000     HN1     96     TWO-POINT CONVERSION ATTEMPT. Advapts pass 10     pass     2     0  <											1
328     Half2     0     22     1     4     NULL     0     1999-12-30 (52.80 000)     JAC 2     0     77     TWO-POINT CONVERSION ATTEMPT. C.Johnson rushes le     nm     2     0       326     Half2     0     17     0     4     NULL     0     1999-12-30 (52.80 000)     WAS 2     0     85     TWO-POINT CONVERSION ATTEMPT. C.Johnson rushes le     pass     0     0       554     Half2     0     16     0     4     NULL     0     1999-12-30 (05.26 00.000)     WAS 2     0     85     (Pass formation) TWO-POINT CONVERSION ATTEMPT. C.P     pass     0     0       14     Half2     0     18     1     4     NULL     0     1999-12-30 (0140 0000)     PT2     0     71     (Pass formation) TWO-POINT CONVERSION ATTEMPT. C.P     pass     2     0       71     Half2     0     24     1     4     NULL     0     1999-12-30 (0140 0000)     ND2     0     58     TWO-POINT CONVERSION ATTEMPT. ARodges pass to G     pass     2											2
326     Helf2     0     17     0     4     NULL     0     1899-123005260000     WAS 2     0     85     TWO-POINT CONVERSION ATTEMPT. M Stafford pass to 8     pass     0     0       554     Half2     0     16     0     4     NULL     0     1899-12300520000     VR2 2     0     85     (Pass formation) TWO-POINT CONVERSION ATTEMPT. C.P     pass     0     0       14     Helf2     0     18     1     4     NULL     0     1899-1230021400000     PT2     0     71     (Pass formation) TWO-POINT CONVERSION ATTEMPT. C.P     pass     2     0       200     Half2     0     18     0     4     NULL     0     1899-1230021400000     PT2     0     71     (Pass formation) TWO-POINT CONVERSION ATTEMPT Adorpts pass to R     pass     0     0       1     566     Half2     0     15     0     4     NULL     0     1899-123012400000     NIG3     0     48     TWO-POINT CONVERSION ATTEMPT Adorpts pass to M     pass     2								-			3
554     Hal2     0     16     0     4     NULL     0     1899-1230 081400000     PT2     0     85     (Pass formation) TWO-POINT CONVERSION ATTEMPT. C.P     pass     0     0       14     Hal2     0     18     1     4     NULL     0     1899-1230 081400000     PT2     0     71     (Pass formation) TWO-POINT CONVERSION ATTEMPT. C.P     pass     2     0       200     Hal2     0     18     0     4     NULL     1     1899-1230 01400000     PT2     0     71     (Pass formation) TWO-POINT CONVERSION ATTEMPT. C.P     pass     0     0       71     Hal2     0     15     0     4     NULL     0     1899-1230 11:070000     NU2     0     58     TWO-POINT CONVERSION ATTEMPT. Adopts pasts 0     pass     0     0       1     565     Hal2     0     15     0     4     NULL     0     1899-1230 11:070000     NU3     0     48     TWO-POINT CONVERSION ATTEMPT. Adopts pasts 0     past     2     0								-			4
14     Hail2     0     18     1     4     NULL     0     1899-12-30 00-140 0000     PT2     0     71     (Pass formation) TWO-POINT CONVERSION ATTEMPT, C.P     pass     2     0       220     Hail2     0     18     0     4     NULL     1     1999-12-30 00-140 0000     MiN 1     0     96     TWO-POINT CONVERSION ATTEMPT, C.P     pass     0     0       71     Hail2     0     24     1     4     NULL     0     1599-12-30 01:10 0000     CH2     0     72     TWO-POINT CONVERSION ATTEMPT. ARodgers pass to R     pass     2     0       0     667     Hail2     0     24     1     4     NULL     0     1599-12-30 11:00 0000     K02     58     TWO-POINT CONVERSION ATTEMPT. ARodgers pass to B     pass     2     0       1     566     Hail2     0     20     0     4     NULL     0     1899-12-30 12500000     SR2     0     71     TWO-POINT CONVERSION ATTEMPT. J.Cutler pass to B.e     pass     2     0											5
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0     667     Helf2     0     15     0     4     NULL     0     1899-1230 110700000     IND 2     0     58     TWO-POINT CONVERSION ATTEMPT. M.Jones-Drew rush     nun     0     0     0       1     566     Half2     0     20     0     4     NULL     0     1899-1230 110700000     ING 3     0     48     TWO-POINT CONVERSION ATTEMPT. M.Jones-Drew rush     nun     0     0     0       2     112     Half2     0     23     1     NULL     0     1899-1230 015200000     SR 2     0     71     TWO-POINT CONVERSION ATTEMPT. M.Saded napes to M     pass     2     0       3     831     Half2     0     16     0     1899-1230 12500000     SR 2     0     81     TWO-POINT CONVERSION ATTEMPT. M.Saded napes to M     pass     2     0       4     126     Half2     0     16     0     1899-12-30 026600000     BUF 2     81     TWO-POINT CONVERSION ATTEMPT. M.Saded napes to M     pass     0     0       5								-			5 9
1     566     Half2     0     20     0     4     NULL     0     1899-12-30 09260 0000     NYG3     0     48     TWO-POINT CONVERSION ATTEMPT. M Cassel rushes up     nun     0     0     0       2     112     Half2     0     23     1     4     NULL     0     1899-12-30 01520 0000     SEA2     0     71     TWO-POINT CONVERSION ATTEMPT. M Cassel rushes up     pass     2     0       3     831     Half2     0     14     1     4     NULL     0     1899-12-30 125 100 000     STL 2     0     82     TWO-POINT CONVERSION ATTEMPT. M Safford pass to M     pass     2     0       4     126     Half2     0     16     0     4     NULL     0     1899-12-30 026000000     BUF 2     0     81     TWO-POINT CONVERSION ATTEMPT. T. Brady pass to B.W     pass     0     0       5     50     Half2     0     18     0     1899-12-30 02600000     BUF 2     31     TWO-POINT CONVERSION ATTEMPT. T. Brady pass to B.M											9
2     112     Hall2     0     23     1     4     NULL     0     1899-12-30 01520 0000     SEA2     0     71     TWO-POINT CONVERSION ATTEMPT. J Cutler pass to E.B     pass     2     0       3     831     Hall2     0     14     1     4     NULL     0     1899-12-30 01520 0000     STL2     0     82     TWO-POINT CONVERSION ATTEMPT. M Stafford pass to M     pass     2     0       4     126     Hall2     0     16     0     4     NULL     0     1899-12-30 02060 0000     BUF 2     0     81     TWO-POINT CONVERSION ATTEMPT. T.Brady pass to M     pass     0     0       5     50     Hall2     0     18     0     1899-12-30 0500 0000     BUF 2     0     31     TWO-POINT CONVERSION ATTEMPT. T.Brady pass to M     pass     0     0       5     50     Hall2     0     18     0     1899-12-30 0500 0000     BUF 2     0     31     TWO-POINT CONVERSION ATTEMPT. T.Brady pass to M     pass     0     0								-			
3     831     Helf2     0     14     1     4     NULL     0     1899-12-30 12-51 0.0000     STL 2     0     82     TWO-POINT CONVERSION ATTEMPT. IN Stafford pass to M     pass     2     0       4     126     Half2     0     16     0     4     NULL     0     1899-12-30 020.000.000     BUF 2     0     81     TWO-POINT CONVERSION ATTEMPT. T. Brady pass to B.W     pass     0     0     0       5     50     Half2     0     18     0     4     NULL     0     1899-12-30 050:00:000     BUF 2     31     TWO-POINT CONVERSION ATTEMPT. T. Brady pass to R.M     pass     0     0     0       5     50     Half2     0     18     0     1899-12-30 02:00:00:00     BUF 2     31     TWO-POINT CONVERSION ATTEMPT. T. Brady pass to R.M     pass     0								-			11
4     126     Half2     0     16     0     4     NULL     0     1899-12-30 02 06 00000     BUF2     0     81     TWO-POINT CONVERSION ATTEMPT. TBradypess to B.W     pass     0     0       5     50     Half2     0     18     0     1899-12-30 00500 0000     BUF2     0     31     TWO-POINT CONVERSION ATTEMPT. TBradypess to B.W     pass     0     0       6     1152     Half2     0     18     0     1899-12-30 102-32 00 000     DET 2     0     68     (Kick formation) TWO-POINT CONVERSION ATTEMPT. J.Rv     pass     0     0											12
5     50     Half2     0     18     0     4     NULL     0     1899-12-30 00500 0000     BUF2     0     31     TWO-POINT CONVERSION ATTEMPT. TBrady pass to R.M     pass     0     0       s     1052     Half2     0     18     0     1899-12-30 02 32 00 000     DET 2     68     (Kick formation) TWO-POINT CONVERSION ATTEMPT J Rv     pass     0     0       s     1052     Half2     0     18     0     1899-12-30 02 32 00 000     DET 2     68     (Kick formation) TWO-POINT CONVERSION ATTEMPT J Rv     pass     0     0											13
s 1052 Halt7 0 18 0 3 NULL 0 1889-12-30 00 32-00 000 DFT 2 0 68 (Kick formation) TWO-POINT CONVERSION ATTEMPT J Rv naes 0 0								-			14
											15
	18 U 3 NULL U 1259-12-3002-3200000 DF12 U DB IKISCROMBADON UVEPOINT CUNVERSION ALTERNET ARV DBSS U U	0.12 0 08	1088-17-30 07 37 00 000		NULL	0.3	10	0	1402	11.12	<
	DESKTOP-99JT234\SQLEXPRESS DESKTOP-99JT234\patiw TestD8 00:00:00 696 rows	DECUTO									

	Sele	ct * From	dbo.[NFL	Data 2009	9-2018]	Where [dow	<b>n]</b> IN (	4);								
09	6 • (															
		8														
1 11	play_id	Messages game_id	home_team	away_team	posteam	posteam_type	defteam	side_of_field	yardline_100	game_date	quarter_seconds_remaining	half earonde remaining	game_seconds_remaining	game_half	quarter_end	d
	2482	2009092001		MIN	DET	home	MIN	DET	58	2009-09-20 00:00:00.000		1207	1207	Half2	Quarter_enu	
	2571	2009092001		MIN	MIN	away	DET	MIN	80	2009-09-20 00:00:00.000	192	1092	1092	Half2	0	
	2703	2009092001		MIN	DET	home	MIN	MIN	42	2009-09-20 00:00:00.000		949	949	Half2	0	
	2973	2009092001		MIN	MIN	away	DET	DET	28	2009-09-20 00:00:00.000		601	601	Half2	0	
	2612	2009092009	BUF	TB	BUF	home	TB	BUF	57	2009-09-20 00:00:00.000	697	1597	1597	Half2	0	
	2729	2009092009	BUF	TB	TB	away	BUF	TB	69	2009-09-20 00:00:00.000	599	1499	1499	Half2	0	
	2910	2009092009	BUF	TB	BUF	home	TB	BUF	74	2009-09-20 00:00:00.000	440	1340	1340	Half2	0	
	3040	2009092009	BUF	TB	TB	away	BUF	BUF	43	2009-09-20 00:00:00.000	301	1201	1201	Half2	0	
	4205	2009092709	BUF	NO	NO	away	BUF	BUF	17	2009-09-27 00:00:00.000	205	205	205	Half2	0	
0	4333	2009092709	BUF	NO	BUF	home	NO	BUF	86	2009-09-27 00:00:00.000	145	145	145	Half2	0	
1	3448	2009111600	CLE	BAL	BAL	away	CLE	BAL	51	2009-11-16 00:00:00.000	309	309	309	Half2	0	
2	3479	2009111600	CLE	BAL	BAL	away	CLE	BAL	56	2009-11-16 00:00:00.000	299	299	299	Half2	0	
3	3583	2009111600	CLE	BAL	CLE	home	BAL	CLE	83	2009-11-16 00:00:00.000	237	237	237	Half2	0	
1	3827	2009111600	CLE	BAL	BAL	away	CLE	CLE	37	2009-11-16 00:00:00.000	26	26	26	Half2	0	
5	1891	2009101100	BAL	CIN	BAL	home	CIN	CIN	49	2009-10-11 00:00:00.000	6	6	1806	Half1	0	1
6	2089	2009101100	RAI	CIN	RAI	home	CIN	RAI	55	2009-10-11 00:00:00 000	733	1633	1633	Half2	0	
																)



Score differential and time remaining in the game were assessed to assign the "pressure" associated with each potential scenario in a game

### Exhibit 2 – Pressure Scale

	Pressur	e Scale		
Point Differential		Qua	rters	
Font Differential	1	2	3	4
Trailing by >=15 pts	Low	Medium	High	High
Winning by >=15pts	Low	Low	Low	Low
Trailing by between 9-14 pts	Low	Medium	Medium	High
Winning by between 9-14 pts	Low	Low	Medium	Medium
Trailing by <=8pts	Low	Medium	High	High
Winning by <=8pts	Low	Medium	Medium	High
Game is Tied	Low	Low	Medium	High

Score differential and time remaining in the game were assessed to assign the "pressure" at each potential scenario in a game

## 2 Point Conversion Attempt Analysis

#### Exhibit 3 – 2 Point Conversion Attempts

Metric	Low	Medium	High	Total
Success	26	56	239	321
Pass	19	37	166	222
Run	7	19	73	99
Failure	28	64	265	357
Pass	18	46	220	284
Run	10	18	45	73
Total	54	120	504	678
% Success	48.15%	46.67%	47.42%	47.35%
% of all attempts that are Passes	68.52%	<b>69.17%</b>	76.59%	74.63%
% of all attempt that are runs	31.48%	30.83%	23.41%	25.37%
% of Passes Successful	<b>51.35%</b>	44.58%	43.01%	43.87%
% of Runs Successful	41.18%	51.35%	61.86%	57.56%

### Exhibit 4 – 2 Point Conversion Ratios

Touchdowns and 2-Point Attempts By Pressure By Year																
Touchdowns by Pressure By Year																
Row Labels	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Grand Total	2009-2014	2015-2017	2009-2014 Average	2015-2017 Average	% Growth in 201
Touchdowns	1,170	1,275	1,247	1,373	1,335	1,288	1,238	1,285	1,304	1,279	12,794	7,688	3,827	1,281.33	1,275.67	0.26
High	286	335	347	352	367	317	365	342	335	344	3,390	2,004	1,042	334.00	347.33	-0.96
Low	520	521	539	584	525	551	498	512	526	556	5,332	3,240	1,536	540.00	512.00	8.59
Medium	364	419	361	437	443	420	375	431	443	379	4,072	2,444	1,249	407.33	416.33	-8.97
Grand Total	1,170	1,275	1,247	1,373	1,335	1,288	1,238	1,285	1,304	1,279	12,794	7,688	3,827	1,281.33	1,275.67	0.26
2-Point Attempts "Went for it"	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Grand Total	2009-2014	2015-2017	2009-2014 Average	2015-2017 Average	% Growth in 20
High	43	43	37	41	56	40	59	60	50	75	504	260	169	43.33	56.33	33.1
Low	2	1	3	4	2	4	6	8	7	17	54	16	21	2.67	7.00	142.8
Medium	10	2	5	9	8	6	16	21	15	28	120	40	52	6.67	17.33	61.5
Grand Total	55	46	45	54	66	50	81	89	72	120	678	316	242	52.67	80.67	48.7
"Did not go for it"	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Grand Total	2009-2014	2015-2017	2009-2014 Average	2015-2017 Average	% Growth in 20
High	243	292	310	311	311	277	306	282	285	269	2,886	1,744	873	290.67	291.00	-7.5
Low	518	520	536	580	523	547	492	504	519	539	5,278	3,224	1,515	537.33	505.00	6.7
Medium	354	417	356	428	435	414	359	410	428	351	3,952	2,404	1,197	400.67	399.00	-12.0
Grand Total	1,115	1,229	1,202	1,319	1,269	1,238	1,157	1,196	1,232	1,159	12,116	7,372	3,585	1,229	1,195	-3.01%
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Grand Total	2009-2014	2015-2017	2009-2014 Average	2015-2017 Average	% Growth in 20
Attempts Per Touchdown	4.70%	3.61%	3.61%	3.93%	4.94%	3.88%	6.54%	6.93%	5.52%	9.38%	5.30%			4.11%	6.32%	48.37%
% Growth from Previous Period		-23.25%	0.02%	8.99%	25.70%	-21.48%	68.54%	5.86%	-20.28%	48.37%					53.84%	48.37%
Attempts Per Team	1.72	1.44	1.41	1.69	2.06	1.56	2.53	2.78	2.25	3.75	2.12			1.65	2.52	48.76%

### Exhibit 4 – 2 Point Conversion Ratios (Continued)

Grand Total	I	railing 9 Ye	ar Averag	e		2009-2014	Average			2015-2017	Average		Chang	ge from 201	5-2017 Av	/erage
	Low	Medium	High	Total	Low	Medium	High	Overall	Low	Medium	High	Overall	Low	Medium	High	Overall
678.00	4.11	10.22	47.67	62.00	16.00	40.00	260.00	316.00	21.00	52.00	169.00	242.00	123.64%	77.45%	34.43%	48.37%
12116.00	526.56	400.11	290.78	1217.44	3224.00	2404.00	1744.00	7372.00	1515.00	1197.00	873.00	3585.00				
12794.00	530.67	410.33	338.44	1279.44	3240.00	2444.00	2004.00	7688.00	1536.00	1249.00	1042.00	3827.00				
5.30%	0.77%	2.49%	14.08%	4.85%	0.49%	1.64%	12.97%	4.11%	1.37%	4.16%	16.22%	6.32%				
		4.8	5%			4.11	l%			6.32	%					



## 4<sup>th</sup> and Short Analysis

### Exhibit 5 – 4<sup>th</sup> and 1 Attempts

4th and 1	Low	Medium	High	Total
Success	376	358	423	1157
Pass	68	77	117	262
Run	308	281	306	895
Failure	174	182	266	622
Pass	41	54	120	215
Run	133	128	146	407
Total	550	540	689	1779
% Success	68%	66%	61%	65%
% of all attempts that are Passes	20%	24%	34%	27%
% of all attempt that are runs	80%	76%	66%	73%
% of Passes Successful	62%	59%	50%	55%
% of Runs Successful	70%	69%	68%	69%

### Exhibit 7 – 4<sup>th</sup> and 1 Over Time

4th and 1 Conversion Over Time	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total	2009-20	013	2014-2018	9 Year Total	9 Year Average	Change from Average
Success	139	130	81	106	122	107	99	111	121	141	1157	578		579	1016	112.89	24.90%
Pass	29	25	20	27	27	24	27	26	21	36	262	128		134	226	25.11	43.36%
Run	110	105	61	79	95	83	72	85	100	105	895	450	'	445	790	87.78	19.62%
Failure	77	58	67	58	69	56	54	64	65	54	622	329		293	568	63.11	-14.44%
Pass	27	21	18	20	23	17	22	26	19	22	215	109		106	193	21.44	2.59%
Run	50	37	49	38	46	39	32	38	46	32	407	220	. '	187	375	41.67	-23.20%
Total	216	188	148	164	191	163	153	175	186	195	1779	907		872	1584	176	10.80%
% Success	64%	69%	55%	65%	64%	66%	65%	63%	65%	72%	65%	64%		66%	64%	64%	12.73%
% of all attempts that are Passes	25.93%	24.47%	25.68%	28.66%	26.18%	25.15%	32.03%	29.71%	21.51%	29.74%	26.81%	26.13	%	27.52%	26.45%	26.45%	12.44%
% of all attempt that are runs	74.07%	75.53%	74.32%	71.34%	73.82%	74.85%	67.97%	70.29%	78.49%	70.26%	73.19%	73.87	%	72.48%	73.55%	73.55%	-4.48%
% of Passes Successful	51.79%	54.35%	52.63%	57.45%	54.00%	58.54%	55.10%	50.00%	52.50%	62.07%	54.93%	54.01	%	55.83%	53.94%	53.94%	15.07%
% of Runs Successful	68.75%	73.94%	55.45%	67.52%	67.38%	68.03%	69.23%	69.11%	68.49%	76.64%	68.74%	67.16	%	70.41%	67.81%	67.81%	13.02%

### Exhibit 6 – 4<sup>th</sup> and 2 Attempts

4th and 2	Low	Medium	High	Total
Success	57	68	156	283
Pass	34	47	125	208
Run	23	21	31	75
Failure	44	63	149	258
Pass	33	45	126	205
Run	11	18	23	53
Total	101	131	305	541
% Success	56%	52%	51%	52%
% of all attempts that are Passes	66%	70%	82%	76%
% of all attempt that are runs	34%	30%	18%	24%
% of Passes Successful	51%	51%	50%	50%
% of Runs Successful	68%	54%	57%	59%

### Exhibit 8 – 4<sup>th</sup> and 2 Over Time

4th and 2 Conversion Over Time	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total	2009-2013	2014-2018	9 Year Total	9 Year Average	Change from Average
Success	21	32	22	30	29	26	25	33	27	38	283	134	149	245	27.22	39.59%
Pass	14	26	13	19	17	20	21	29	22	27	208	89	119	181	20.11	34.25%
Run	7	6	9	11	12	6	4	4	5	11	75	45	30	64	7.11	54.69%
Failure	35	32	34	23	17	18	26	22	27	24	258	141	117	234	26.00	-7.69%
Pass	25	24	30	21	15	16	23	12	21	18	205	115	90	187	20.78	-13.37%
Run	10	8	4	2	2	2	3	10	6	6	53	26	27	47	5.22	14.89%
Total	56	64	56	53	46	44	51	55	54	62	541	275	266	479	53.22	16.49%
% Success	38%	50%	39%	57%	63%	59%	49%	60%	50%	61%	52%	49%	56%	51%	51%	19.83%
% of all attempts that are Passes	69.64%	78.13%	76.79%	75.47%	69.57%	81.82%	86.27%	74.55%	79.63%	72.58%	76.34%	74.18%	78.57%	76.83%	76.83%	-5.53%
% of all attempt that are runs	30.36%	21.88%	23.21%	24.53%	30.43%	18.18%	13.73%	25.45%	20.37%	27.42%	23.66%	25.82%	21.43%	23.17%	23.17%	18.32%
% of Passes Successful	35.90%	52.00%	30.23%	47.50%	53.13%	55.56%	47.73%	70.73%	51.16%	60.00%	50.36%	43.63%	56.94%	49.18%	49.18%	21.99%
% of Runs Successful	41.18%	42.86%	69.23%	84.62%	85.71%	75.00%	57.14%	28.57%	45.45%	64.71%	58.59%	63.38%	52.63%	57.66%	57.66%	12.22%

PATRICK WALSH

## 4<sup>th</sup> and Short Analysis

### Exhibit 9 - 4<sup>th</sup> and 1 By Pressure Over Time

		2009			2010			2011			2012			2013			2014			2015			2016			2017			2018			Total		10 Year Total
4th and 1 by Year w/Pressure	Low	Medium	High																															
Success	54	36	49	49	36	45	20	27	34	37	34	35	31	33	58	31	31	45	37	28	34	29	45	37	48	36	37	40	52	49	376	358	423	1157
Pass	13	5	11	5	9	11	5	8	7	8	5	14	5	3	19	6	8	10	6	10	11	4	13	9	9	3	9	7	13	16	68	77	117	262
Run	41	31	38	44	27	34	15	19	27	29	29	21	26	30	39	25	23	35	31	18	23	25	32	28	39	33	28	33	39	33	308	281	306	895
Failure	30	15	32	14	18	26	21	13	33	12	16	30	19	21	29	11	16	29	20	16	18	15	28	21	18	16	31	14	23	17	174	182	266	622
Pass	8	4	15	5	4	12	3	3	12	2	4	14	7	4	12	1	7	9	5	4	13	3	13	10	3	3	13	4	8	10	41	54	120	215
Run	22	11	17	9	14	14	18	10	21	10	12	16	12	17	17	10	9	20	15	12	5	12	15	11	15	13	18	10	15	7	133	128	146	407
Total	84	51	81	63	54	71	41	40	67	49	50	65	50	54	87	42	47	74	57	44	52	44	73	58	66	52	68	54	75	66	550	540	689	1779
% Success	64%	71%	60%	78%	67%	63%	49%	68%	51%	76%	68%	54%	62%	61%	67%	74%	66%	61%	65%	64%	65%	66%	62%	64%	73%	69%	54%	74%	69%	74%	68%	66%	61%	65%
% of all attempts that are Passes	25%	18%	32%	16%	24%	32%	20%	28%	28%	20%	18%	43%	24%	13%	36%	17%	32%	26%	19%	32%	46%	16%	36%	33%	18%	12%	32%	20%	28%	39%	20%	24%	34%	27%
% of all attempt that are runs	75%	82%	68%	84%	76%	68%	80%	73%	72%	80%	82%	57%	76%	87%	64%	83%	68%	74%	81%	68%	54%	84%	64%	67%	82%	88%	68%	80%	72%	61%	80%	76%	66%	73%
% of Passes Successful	62%	56%	42%	50%	69%	48%	63%	73%	37%	80%	56%	50%	42%	43%	61%	86%	53%	53%	55%	71%	46%	57%	50%	47%	75%	50%	41%	64%	62%	62%	62%	59%	49%	55%
% of Runs Successful	65%	74%	69%	83%	66%	71%	45%	66%	56%	74%	71%	57%	68%	64%	70%	71%	72%	64%	67%	60%	82%	68%	68%	72%	72%	72%	61%	77%	72%	83%	70%	69%	68%	69%

### Exhibit 10 - 4<sup>th</sup> and 2 By Pressure Over Time

		2009			2010			2011			2012			2013			2014			2015			2016			2017			2018			Total		10 year Tota
4th and 2 by Year w/Pressure	Low	Medium	High	Low	Medium	1 High	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High <mark>L</mark>	ow	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High	
Success	3	5	13	2	13	17	7	5	10	10	5	15	7	7	15	5	6	15	3	4	18	5	10	18	7	5	15	8	8	22	57	68	158	283
Pass	1	2	11	2	10	14	4	3	6	4	4	11	3	3	11	3	4	13	3	3	15	4	8	17	5	4	13	5	6	16	34	47	127	208
Run	2	3	2		3	3	3	2	4	6	1	4	4	4	4	2	2	2		1	3	1	2	1	2	1	2	3	2	6	23	21	31	75
Failure	6	9	20	8	8	16	4	9	21	4	3	16	2	6	9	3	4	11	6	3	17	5	5	12	4	7	16	2	9	13	44	63	151	258
Pass	3	5	17	8	5	11	3	9	18	3	2	16	1	6	8	3	2	11	5	3	15	3	1	8	3	5	13	1	7	10	33	45	127	205
Run	3	4	3		3	5	1		3	1	1		1		1		2		1		2	2	4	4	1	2	3	1	2	3	11	18	24	53
Total	9	14	33	10	21	33	11	14	31	14	8	31	9	13	24	8	10	26	9	7	35	10	15	30	11	12	31	10	17	35	101	131	309	541
% Success	33%	36%	39%	20%	62%	52%	64%	36%	32%	71%	63%	48%	78%	54%	63%	63%	60%	58%	33%	57%	51% 5	50%	67%	60%	64%	42%	48%	80%	47%	63%	56%	52%	51%	52%
% of all attempts that are Pass	e 44%	50%	85%	100%	71%	76%	64%	86%	77%	50%	75%	87%	44%	69%	79%	75%	60%	92%	89%	86%	86% 7	70%	60%	83%	73%	75%	84%	60%	76%	74%	66%	70%	82%	76%
% of all attempt that are runs	56%	50%	15%	0%	29%	24%	36%	14%	23%	50%	25%	13%	56%	31%	21%	25%	40%	8%	11%	14%	14% 3	30%	40%	17%	27%	25%	16%	40%	24%	26%	34%	30%	18%	24%
% of Passes Successful	25%	29%	39%	20%	67%	56%	57%	25%	25%	57%	67%	41%	75%	33%	58%	50%	67%	54%	38%	50%	50% 5	57%	89%	68%	63%	44%	50%	83%	46%	62%	51%	51%	50%	50%
% of Runs Successful	40%	43%	40%	0%	50%	38%	75%	100%	57%	86%	50%	100%	80%	100%	80%	100%	50%	100%	0%	100%	60% 3	33%	33%	20%	67%	33%	40%	75%	50%	67%	68%	54%	56%	59%

## Data was analyzed on a year-to-year basis as well as by pressure levels for $4^{th}$ and 1 opportunities

### Exhibit 11 – 4<sup>th</sup> and 1 by Pressure and Field Position Over Time

4th and 1 By Position on Field and Pressure		2009 2010 High Low	2010 Medium	2010 20 High Loy	11 2011 2 v Medium H			2013 2013 Lov Mediur					2015 2016 High Low	i 2016 Medium		2017 20 Medium Hi		2018 Medium	2018 Low	Total Medium	High		railing 9 Year A .ov Medium	rerage High Low	Change from Average Medium High O
Inside Own 40 Attenpts Inside Own 40 Did not golorit at Total instances inside own 40 Attempts as a % of Total Instances By Pressure All Attempts as a % of Total Instances	7 2 36 42 <b>43 44</b>	11 1 30 41 <b>41 42</b>	1 28 <b>29</b>	6 25	1 2 44 47 <b>45 49</b>	4 1 30 62 34 63 76% 1.59%	5 1 58 2 63 34 7.94% 27.78 9.88%	0 4 6 58 53 6 <b>62 5</b> 3	1 17 2 25 42 40.48% 1.	1 2 50 39 51 41	11 22 33	1 1 46 41 47 42 % 2.38% 3 10.66%	11 22 4 <b>33 4</b>	3 - 46 45 9 <b>45</b>	11		9 33 3 42 3: 43% 7.69%	34	11 24 22 472 33 496 3.33% 4.84%	6 439		1,299	2.33 1.89 48.44 43.11 50.78 45.00 60% 4.20% 10.73%	10.00 26.78 36.78 27.19% 67.40	1% 40.14% 22.59% <mark>40</mark>
Between own 4D and 49 Attempts Inside between own 40 and 49 Eidnotgoioit a Total instances: between own 40 and 49 Attempts as a X of Total Instances: By Pressure All Attempts as a X of Total Instances	3 4 17 22 20 26 15.00% 15.38% 52 25.40%	9 7 8 23 <b>17 30</b> 2.94% 23.33%	3 16 19 15.79% 32.81%	11 4 15 73.33% 4.17	1 4 23 13 24 17 7× 23.53× 39 23.19%		1 20 1 21 20 4.76% 35.005	0 25 22	22 54.55% 11	4 8 32 16 <b>36 24</b> .11% <b>33.33%</b> 29.41%		4 3 17 15 21 18 5% 16.67% 0 26.53%		6 5 16 20 12 25 17 20.00% 4 28.33%	13 2	7 1 17 13 14 14 17 7.14% 62. 17.10%	15 9 1 24 29 50% 28.00%	5 14	7 48 4 210 11 256 3.64% 17.97%	6 200		641	4.33 3.67 21.33 17.00 25.67 20.67 88% 17.74% 27.41%	10.00 9.33 19.33 <b>51.72% 65.85</b>	ix 141.56% 23.03% <mark>45</mark>
Between Oppanent 41-50 Antenpts Inside between opponent 41-50 Did not go for it Total instances between opponent 41-50 Attempts as a % of Total Instances By Pressure #11 Attempts as a % of Total Instances	6 8 11 15 17 23 35.29× 34.78× 68 44.64%	11 8 5 8 <b>16 16</b> 8. <b>75% 50.00%</b>	6 15 21 28.57% 42.86%	7 5 12 58.33% 43.7	7 6 9 4 16 10 5% 60.00% 64.		11 11 22 1 50.00% 60.00%	9 9 ! 6 7 ! 5 16 10 4 56.25% 50.00% 58.339		5 4 8 6 13 10 .46% 40.00% 58.97%	14 2 16 87.50% 65.00	13 9 7 3 20 12 0% 75.00% 0 68.09%	10 5 15 1 36.67% 70.00	7 14 3 4 10 18 17.78% 8	7 1 8 7.50% 68.42	13 8 6 2 19 10 72,50%	8 3 11 1: 73% 84.62%		7 84 1 75 8 159 7.50% 52.83%	9 156			8.11 7.89 8.11 7.22 16.22 15.11 .00% 52.21% 56.64%	9.11 3.89 13.00 70.09% 69.23	1% 81.97% 24.85% <mark>59</mark>
Between Oppanent 31-40 Attempts had between opponent 31-40 Did not go for it Total instances between opponent 31-40 Attempts as a X of Total Instances By Pressure All Attempts as a X of Total Instances	17 7 1 2 18 9	11 13 1 3 12 16 1.67% 81.25%	15 1 93.75% 89.13%	13 1 14 92.86% 81.8	9 11 2 4 <b>11 15</b>	11 9 2 2 13 11 62% 81.82% 7	10 1 3 13 1 16.92% 85.71 31.58%	2 12 1 2 3 3 4 15 17 60.00% 82.35% 83.67%	4 15 3 2 7 17 2 88.24% 77	7 7 2 2 9 9 .78% 77.78% 80.65%	11 2 13 84.62% 63.64	7 12 4 - 11 12	10 2 12 33.33% 63.64	7 21 4 4 11 25 % 84.00% 6 75.00%	8 4 12 6.67% 88.24	15 10 2 4 <b>7 14</b>	9 2 11 9 82% 77.78%	76 21 37	9 103 3 25 12 128 5.00% 80.47%	3 113 5 24 <b>3 137</b>	109 21 <b>130</b> 83.85%		10.67 11.89 2.56 2.56 13.22 14.44	11.11 2.00 13.11 84.75% -3.55	11.50% <mark>-4</mark>
Between Oppanent 21-30 Attempts Inside between opponent 21-30 Did not go for it Total instances between opponent 21-30 Attempts as a X of Total Instances By Pressure All Attempts as a X of Total Instances	13 8 7 5 <b>20 13</b>	11 8 2 2 13 10 4.62% 80.00%	10 7 1 <b>7</b>	9 4 13 69.23% 76.9	10 4 3 8 1 <b>3 12</b>	9 10 2 7 11 17 82% 58.82% 5	7 6 13 1	7 3 1 1 5 1 3 8 15 4 37.50% 53.33%	3 10 7 6 5 16 5 62.50% 71	5 8 2 4 7 12	8 1 9 88.89% 72.73	8 4 3 4 11 8	4 8 50.00% 57.14	4 4 3 6 7 10	8 3 11 - 2.73% 83.33	156 36 1 <b>812</b>	6 1 7 1 71% 63.64%	777 411 <b>18</b>	6 83 2 33 8 122 5.00% 68.03%	3 66 9 54 2 <b>120</b>	78 26 104 75.00%		8.44 6.56 3.89 5.89 12.33 12.44	8.00 2.67 10.67 <b>75.00% -7.06</b>	% 66.10% 0.00% <mark>14</mark>
Between Opponent 11-20 Attempts Inside between opponent 11-20 Did not go for it Total instances between opponent 11-20 Attempts as a X of Total Instances By Pressure All Attempts as a X of Total Instances	6 11 7 5 13 16 46.15% 68.75% 76 64.29%	10 8 3 4 13 12 6.92% 66.67%	5 4 9 55.56% 52.78%	6 9 15 40.00% 30.7	4 5 9 3 13 8 7% 62.50% 70. 51.61%		3 10 13 4 23.08% 87.507 14.12%	7 8 9 1 9 1 3 17 1 4 47.06% 45.45% 53.85%		2 5 2 3 4 8 .00% 62.50% 47.06%	1 4 5 20.00% 77.74	7 2 2 6 9 8 8% 25.00% 4 59.09%	4 1 5 1 30.00% 40.00	4 9 6 6 10 15 15 60.00% 4 50.00%	7 8 15 6.67% 42.86	3 8 4 6 7 14 × 57.14× 50. 51.61%	5 5 10 5 00% 66.67%		9 53 6 54 15 107 0.00% 49.53%				5.22 5.89 5.67 5.44 10.89 11.33 .96% 51.96% 53.08%	6.11 4.11 10.22 <b>59.78% 39.0</b>	1% 64.96% 0.36% <mark>33</mark>
Inside Opponent 10 Attempts Inside inside opponent 10 Ditont go forit Total instances inside opponent 10 Attempts as a X of Total Instances Bg Pressure All Attempts as a X of Total Instances	32 11 9 8 41 19 78.05% 57.89% 66 70.11%	18 18 9 8 27 26 5.67% 69.23%	14 10 24 58.33% 63.75%	19 11 <b>30</b> 63.33% 42.8	9 8 12 14 21 22 6% 36.36% 80. 52.38%		13 1 15 28 1! 16.43% 86.67 50.29%	3 11 1 2 14 5 5 25 20 % 44.00% 65.38 59.749	69.23% 75	18 13 6 6 24 19 .00% 68.42% 73.44%		17 13 4 7 21 20 5% 65.00%		13 20 8 6 21 26 1% 76.92% 7 70.97%	14	11 16 6 9 17 25 1% 64.00% 69. 66.15%		13 23 2 2 5 25 5 92.00% 8 88.33%	20 23	63.25%	151 61 212 71.23% .86%		16.00 13.89 8.56 9.33 24.56 23.22 5.16% 59.81% 64.79%	14.89 6.44 21.33 <b>69.79% 33.0</b> 1	1x 53.82x 21.79x <mark>36.</mark>
Cumulative Total Total Attempts "VENT FOR IT" Total Did not go for it Total Instances Attempts as a X of Total Instances By Pressure All Attempts as a X of Total Instances	84 51 88 99 <b>172 150</b>	81 63 58 89 139 152 3.27% 41.45%	54 81 <b>135</b>	71 59 130 1 54.62% 28.6	41 40 102 93 14 <b>3 133</b>	67 49 63 128 130 177 54% 27.68% 2	50 6 123 5 1 <b>73 11</b>	5 50 5 5 118 10 6 168 154 29.76% 35.067 40.999	4 87 ) 57 <b>4 144</b> <b>: 60.42% 2</b> \$	42 47 102 76 <b>144 123</b>	74 48 122 1 60.66% 40.7	57 44 83 76 40 120	52 46 98 13 53.06% 33.85	44 73 86 91 <b>30 164</b>	58 55 113 1 51.33% 42.04	66 52 91 76 57 128	128 12	i4 75 i7 47 i <b>1 122</b>	41 g	50 540 54 862 04 1,402 7% 38.52%	689 538 1 227	2,354	55 52 99 91 <b>154 142</b>	69 55 124 55.63% 24.44	1% 69.22% 10.89% <mark>33.</mark>

Patrick Walsh

## Data was analyzed on a year-to-year basis as well as by pressure levels for 4<sup>th</sup> and 2 opportunities

### Exhibit 12 – 4<sup>th</sup> and 2 by Pressure and Field Position Over Time

4th and 2 By Position on Field and Pressure			2009 21 1iah La						011 20 igh Lo						013 20 iah Lo				2015 Medium	2015 High	2016 Low M		2016 20 figh La			7 2018 h Low	2018 Medium	2018 High	Low 1	Total Medium I				Year Avera Iedium H		Char Low M	nge from A Iedium	verage High Overa
Inside Own 40 Attempts inside Own 40 Did not goforit Total instances inside own 40 Attempts as a X of Total Instances By Perssure All Attempts as a X of Total Instances		1 28 29 8.45% 12 1.82%	3 21 24 1.50% 0.0	- 37 37 10% 0.0	36 <b>36</b>	4 24 28 29% 0.0		3 29 <b>32</b>	4 30	1 41 42 3% 2.	1 33 <b>34</b>	7 19 26	- 36 36 .00% 0.1	- 35 <b>35</b>	6 22 28	42 42	28 28 2 28 2 24 12.50	3 - 21 3 24 31	1 35 1 35	5 22 27	- 33 33 0.00% 3	1 30 <b>31</b>	2 14 16	33 33	- 35 35 0% 20.8	5 19 3 24 38	1 2 7 27 3 29	5 9 14	2 364 <b>366</b>	8 316 <b>324</b>	44 201 245 7.96% 5.	54 881	0.11 36.33 36.44 <b>0.30% 2</b>	0.67 32.11 32.78 2	4.33 21.33 25.67			11.54% <mark>83.36</mark>
Between own 40 and 49 Attempts histo between own 40 and 49 Didn tog tof tot Total instances between own 40 and 49 Attempts as a X of Total Instances By Pressure MI Attempts as a X of Total Instances		2 15 17 1.76% 51 5.91%	4 3 7 7.14% 0.0	- 13 13 10% 18.1 13.8	2 9 11 18% 25. 89%	3 9 12 00% 0.0		- 16 16 .00% 10. .17%	1 9 10 00% 0.0		- 16 .00% 2 .52%	3 8 11 7.27% 0		2 13 15 33% 7.6	1 12 13 39% 4.17		25.00	3 - 9 18 12 18 1% 0.00%		4 8 12 33.33%		1 15 16 3.25% 31 3.46%	6 13 19 .58% 13.0	3 20 23 04% 0.0 10.1		3 - 14 1 17 16 5% 0.00%	1 6 8 5 9 11.11% 20.00%	6 4 10 60.00%	5 177 182 2.75%	11 141 152 7.24% 27 10.94		50 407 457 ).94% 3	3.01% 6	14.78 15.89	3.11 9.44 12.56 . <b>78% -10</b>	00.00% 58	3.89% 14	42.14% <mark>96.28</mark>
Between Oppanent 41-50 Attempts Inside between opponent 41-50 Didnot gofor it Total instances between opponent 41-50 Attempts as a % of Total Instances By Pressure	2 9 11 18.18% 1	1 6 7 4.29% 12	1 7 8 2.50% 9.0	1 10 11 19% 21.4	3 11 14 43% 43.	7 9 16 75% 0.0	- 12 12 00% 22	2 7 9 22% 50.	2 2 4 00% 11.1	1 8 9 1% 10	1 9 10 .00% 4	4 6 10 0.00% 0	- 8 8 .00% 0.1	- 16 16 )0% 41.	5 7 12 67% 14.2		2 10 12 % 60.00	6 2 4 5 10 7 1% 28.57%	2 1 5 11 7 12 4 8.33%	6 2 8 75.00%	2 6 8 25.00% 3	4 8 12 3.33% 71	5 2 7 .43% 10.0			6 2 8 (0 0% 33.33	2 6 4 6 5 12 4 50.00%	4 1 5 80.00%	13 83 96 13.54%	23 94 117 19.66% 52	46 42 88 2.27% 27	82 219 301 7.24% 1	1.22 8.78 10.00 12.22% 1	9.78 11.67	4.67 4.56 9.22 .60% 17	2.73% 208	8.82% 5	i8.10% <mark>107.20</mark>
All Attempts as a X of Total Instances Between Oppanent 31-40 Attempts Inside between opponent 31-40 Did not go for it	1 1 3	5.38% 6 2	8 2	<b>26.</b>	6 3	9	8 7	5.00% 7 4	8 2	20 7 2	1 6	4 2	4 11	89% 7 9	5 4	27.78	5 2	5 3	<b>33.33%</b>	4	2 6	0.74% 4 4	5	<b>32.2</b>	<b>6%</b>	4	<b>52.17%</b>	83	39 49	27.24 43 43	60 37	142 129	3.67 5.33	4.44	5.78 3.78			
Total instances between opponent 31-40 Attempts as a % of Total Instances By Pressure All Attempts as a % of Total Instances		8 5.00% 80 8.18%	10 ).00% 66.	6 67% 66.0 67.8		13 23% 53.		11 6.64% 80. 6.89%	10 00% 77.7		7 .29% 6 I.55%	6 6.67% 26		16 75% 55. 00%	9 56% 22.2	9 2% 71.43 46.15	% 50.00	10 8 1% 37.50%		7 57.14%	8 25.00% 5 4	8 0.00% 50 2.31%	10 1.00% 28.9	7 57% 50.0 39.2		11 6% 85.71%	7 3 4 0.00% 66.67%	11 72.73%	88 44.32% 5	86 50.00% 6 52.40		271 2.40% 4			9.56 .47% 11	0.39% -10	10.00% 2	0.28% <mark>30.21</mark>
Between Opponent 21-30 Attempts Inside between opponent 21-30 Did not go for it Total instances between opponent 21-30 Attempts as a X of Total Instances By Pressure	3 6 9	2 4 6	5 3 8	3 4 7 867 501	3 3 6	4 4 8 00× 22	2 7 9	- 10 10 00% 50	3 3 6 00% 26.6	4 11 15	- 8 00% 4	4 5 9	- 10 10	- 6 60% 25	2 6 8 00× 33 3	2 4 6		1 3 9 8 10 11	3 - 8 9 1 9	3 8 11 27 27 4	4 6 10 40.00% 2	2 7 9	1 6 7 29× 125	2 14 16	1 8 9	3 - 5 ! 8 !	1 5 10 5 11	5 2 7	23 75 98	10 73 83	31 51 82 7 80% 24	64 199 263	2.56 7.78 10.33	7.00 8.00	2.89 5.44 8.33	10 00*/ _22	7 27•/ 10	06.04% 7.95
Attempts as a 2 or rotal instances by Pressure All Attempts as a 2 of Total Instances		3.48%	50% 42.	007. 50.0 47.6		00% 22.		00% 50.	00% 20.0		i.00% 4	4.44% U		33% 33%	00% 33.3	16.00		A 21.21A	19.35%	21.21%		6.92% I4	.237 12.3	18.1		0% 0.00%	26.09%	11.43%	23.47%	24.33		4.33% Z		4.17%	.077IU	JU.UU% -21	1.217. IL	JD.U4% (.33)
Between Oppanent 11-20 Attempts Inside between opponent 11-20 Did not goforit Total instances between opponent 11-20 Attempts as a X of Total Instances By Pressure	- 10 10 0.00% 0	- 8 1.00% 60	3 2 5 0.00% 11.	1 8 9 11% 25.0	2 6 8 00% 27.	3 8 11 27% 12.	1 7 8 .50% 0.	- 8 80% 41.		1 12 13 3% 22	2 7 9	4 3 7 7.14% 28	2 5 7 8.57% 20.	2 8 10 00% 10.	1 9 10 00% 14.2	1 - 6 7 9% 0.00	4 4 × 40.00	4 - 6 10 10 10 1% 0.00%	, ,	3 7 10 30.00%	1 5 6 16.67% 1	1 5 6 6.67% 20	2 8 10 .00% 0.0	- 13 13 10% 30.0	3 7 10 0% 50.0	2 - 2 4 0% 0.00%	4 5 4 5 8 50.00%	3 1 <b>4</b> <b>75.00%</b>	7 81 88 7.95%	14 65 79 17.72% 31	30 53 83 6.14% 20	51 199 250 0.40% 8	0.78 8.44 9.22 8. <b>43% 1</b> 4	6.78 7.89	8.78	0.00% 255	5.00% 11	19.44% <mark>118.05</mark>
All Attempts as a % of Total Instances Inside Opponent 10	1	3.04%		21.4	43%		21	.43%		24	.14%		18	52%		23.81	%		10.71%		1	8.18%		18.5	2%		41.18%			20.40	1%		1	8.88%				
Attempts Inside inside opponent 10 Did not go for it Total instances inside opponent 10	2 11 13	2 7 9	9 11 20	1 25 26	5 14 <b>19</b>	3 5 8	- 21 <b>21</b>	2 15 17	8 10 <b>18</b>	- 15 <b>15</b>	3 13 16	5 16 21	3 9 12	2 11 13	4 10 14	13	1 22 23	4 9 1 13 1	1 2 17 8 8 10	10 7 17	1 10 11	2 10 12	9 9 18	3 7 10	- 12 12	8 7 15	1 3 5 16 6 19	9	4 5 9		150 15	53 4	98 1.3 350 14.3 148 15.4	14 14.56	16.00	140 044	0.00%	0.074 0.04
Attempts as a % of Total Instances By Pressure All Attempts as a % of Total Instances		22.22% 4 30.95%	5.00% 3.		.32% 37 .98%	.50% 0.		1.76% 44 7.86%	.44% 0.0		3.75% 2 5.38%	23.81% 2		.38% 28 .08%	.57% 0.0	0% 4.35 10.2		17 5.567	20.00% 28.89%	58.82%		16.67% 5 29.27%	0.00% 30.		0% 53.3 73%	53% 16.67	23.53% 23.53%		44.44% {	8.28% 14.1	67% 41.83 21.88%	5% 21.88	5% 7.913	21.74%		110.61%	0.06%	6.67% 8.24
Cumulative Total Total Attempts "VENIT FOR IT Total Did not go for it Total Instances Attempts as a % of Total Instances By Pressure	9 88 97 9.28%	14 70 84 16.67% 4	33 49 82 0.24% 9	10 99 <b>109</b> 17% 22.	24 82 106 .64% 34	33 63 96	12 118 130 .23% 11	12 89 101 1.88% 35	34 63 97 5.05% 11.4	14 108 122 18% 8	8 92 100	31 59 <b>90</b> 34.44% \$	9 91 100 1.00% 11	13 98 111 .71% 25	24 70 94 .53% 6.9	8 107 115 6% 10.2	~~	26 63 9 89 10: 1% 8.74%	3 99	35 57 <b>92</b> 38.04%	10 83 <b>93</b> 10.75%	15 79 94 15.96% 3	30 57 87 4.48% 9.8	11 101 112 82% 11.1	12 96 108 11% 35.6	31 56 7 87 8 33% 12.05	10 17 '3 74 <b>3 91</b> % <b>18.68</b> %	35 25 60 58.33%		1,064	860 5 992 87	74 2,9	541 384 - 10 325 - 10 3% 9.29;		90	29.75%	47.48%	72.66% 48.8
All Attempts as a % of Total Instances	:	21.29%		21	.54%		1	7.68%		1	6.99%		15	.08%		14.5	7%		17.35%		1	20.07%		17.			<mark>26.50%</mark>				18.63%		0.20	17.80%				

PATRICK WALSH

# Quarterback runs were further inspected (replays watched when possible) to clarify if the play was a designed run or a scramble on a pass play

### Exhibit 13 – QB Runs on 2 Point Conversions

description	play_ty	Pass_PI -	Run_pla 🔻	QB_Scramble 👻	Designed_QB_Run 👻
(Pass formation) TWO-POINT CONVERSION ATTEMPT. K.Orton pass to B.Marshall is incomple	pass	1	0	0	0
TWO-POINT CONVERSION ATTEMPT. J.McCown pass to T.Benjamin is incomplete. ATTEMPT	pass	1	0	0	0
TWO-POINT CONVERSION ATTEMPT. J.Flacco pass to J.Forsett is incomplete. ATTEMPT FAIL:	pass	1	0	0	0
TWO-POINT CONVERSION ATTEMPT. J.McCown pass to A.Hawkins is complete. ATTEMPT SU	pass	1	0	0	0
TWO-POINT CONVERSION ATTEMPT. J.Cutler pass to M.Forte is complete. ATTEMPT SUCCE	pass	1	0	0	0
TWO-POINT CONVERSION ATTEMPT. L.Jones pass to A.Brown is incomplete. ATTEMPT FAILS	pass	1	0	0	0
TWO-POINT CONVERSION ATTEMPT. C.Kaepernick pass to A.Boldin is incomplete. ATTEMPT	pass	1	0	0	0
(Pass formation) TWO-POINT CONVERSION ATTEMPT. L.McCoy rushes right guard. ATTEMPT	run	0	1	0	0
TWO-POINT CONVERSION ATTEMPT. B.Hoyer pass to J.Grimes is incomplete. ATTEMPT FAILS	pass	1	0	0	0
TWO-POINT CONVERSION ATTEMPT. P.Rivers pass to L.Green is complete. ATTEMPT SUCCE	pass	1	0	0	0
TWO-POINT CONVERSION ATTEMPT. P.Rivers pass to L.Green is complete. ATTEMPT SUCCE	pass	1	0	0	0
TWO-POINT CONVERSION ATTEMPT. J.Flacco pass to N.Boyle is complete. ATTEMPT SUCCE	pass	1	0	0	0
TWO-POINT CONVERSION ATTEMPT. N.Foles pass to J.Cook is complete. ATTEMPT SUCCEE	pass	1	0	0	0
(Pass formation) TWO-POINT CONVERSION ATTEMPT. T.Gurley rushes right guard. ATTEMPT	run	0	1	0	0
TWO-POINT CONVERSION ATTEMPT. T.Bridgewater rushes right end. ATTEMPT SUCCEEDS.	run	0	1	0	1
(Pass formation) TWO-POINT CONVERSION ATTEMPT. A.Rodgers pass to D.Adams is complete	no_play	N/A	N/A	0	0
(Pass formation) TWO-POINT CONVERSION ATTEMPT. M.Mariota pass to D.Walker is comple	pass	1	0	0	0
(Pass formation) TWO-POINT CONVERSION ATTEMPT. B.Roethlisberger pass to De.Williams	pass	1	0	0	0
(Pass formation) TWO-POINT CONVERSION ATTEMPT. J.Winston pass to R.Shepard is incomp	pass	1	0	0	0
TWO-POINT CONVERSION ATTEMPT. J.Langford rushes up the middle. ATTEMPT SUCCEEDS.	run	0	1	0	0
TWO-POINT CONVERSION ATTEMPT. A.Rodgers pass to D.Adams is incomplete. ATTEMPT FA	pass	1	0	0	0
TWO-POINT CONVERSION ATTEMPT. B.Bortles pass to A.Hurns is incomplete. ATTEMPT FAIL	pass	1	0	0	0
TWO-POINT CONVERSION ATTEMPT. J.Flacco pass to K.Aiken is incomplete. ATTEMPT FAILS.	pass	1	0	0	0
(Pass formation) TWO-POINT CONVERSION ATTEMPT. B.Roethlisberger pass to A.Brown is co	pass	1	0	0	0
(Pass formation) TWO-POINT CONVERSION ATTEMPT. B.Osweiler rushes up the middle. ATTE	run	0	1	1	0

Highlighted above are 2 plays, one of which was determined to be a QB scramble that was wrongly classified as a run play, which was later converted to a pass, and the other a designed QB run (correctly called a run)

Many of the designed runs were QB draws, zone reads, or jumbo formations used on the goal line

There were roughly 20 plays with no video found, in which case, the original classification was kept

So What? The pass total could be higher than indicated, closer to 80% rather than 75% on 2 point conversions

Patrick Walsh