University of Oregon Running Game

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Introduction

The purpose of this analysis is to analyze University of Oregon football's running game over time. We aim to determine the following:
1. How's the rushing offense been trending?
2. Who's the most effective & efficient runner?
3. Identify other interesting tidbits

The chart below shows rushing plays during the 2010-2020 timeframe. In the timeframe, Oregon competed in 2 national championships. 2010, 2014 in the following charts show those championship runs. EPA is the expected or predicted points per attempt (2010-2013, we used PPA, 2014-2020 we used EPA), this means how much points could have results from any rush attempt. A successful run is more than more than 50% of distance to 1st down rushing yards on 1st down (i.e. First down with 10 yards to go, a rush of over 5 yards is successful run), more than 70% on 2nd down and distance to go, or if the 3rd or 4th down run resulted in a first down. The success rate would yield the amount of a successful runs to attempts. YPC is the average yards gained during rush attempt, and plays is the total number of rushing attempts on a given season. It should be noted that we filtered out any 2-point conversion attempts as not part of the analysis.

Team Analysis

We can see that in the Championship runs the running game was very identical with the exception that 2014 had a higher mean_EPA meaning much more explosive plays per attempt. Keep that in mind when we analyze players performance. The Chip Kelly years was much more rush heavy (600+ rush attempts). You can see the Mark Helfrich/Scott Frost combo was actually the most explosive in the 1st year (2013) and most efficient at 53% success rate and a 6.6 yards gained average in less than 100 rush attempts in the previous season. You could see the offense started to shy away from the rush game. We can see it's less successful but the EPA went up meaning it was a much more explosive rushing attack. Largely the 2014 campaign relied on explosive runs to make it the National championship. The removal of either Mark Helfrich or Scott Frost involved in the offense, we can say that Oregon has never been the same. The yards per attempt in 2020 reach 2014 levels but the expected points per attempt isn't good, which probably means the offense lacked any explosiveness. Something to keep an eye on in 2021.

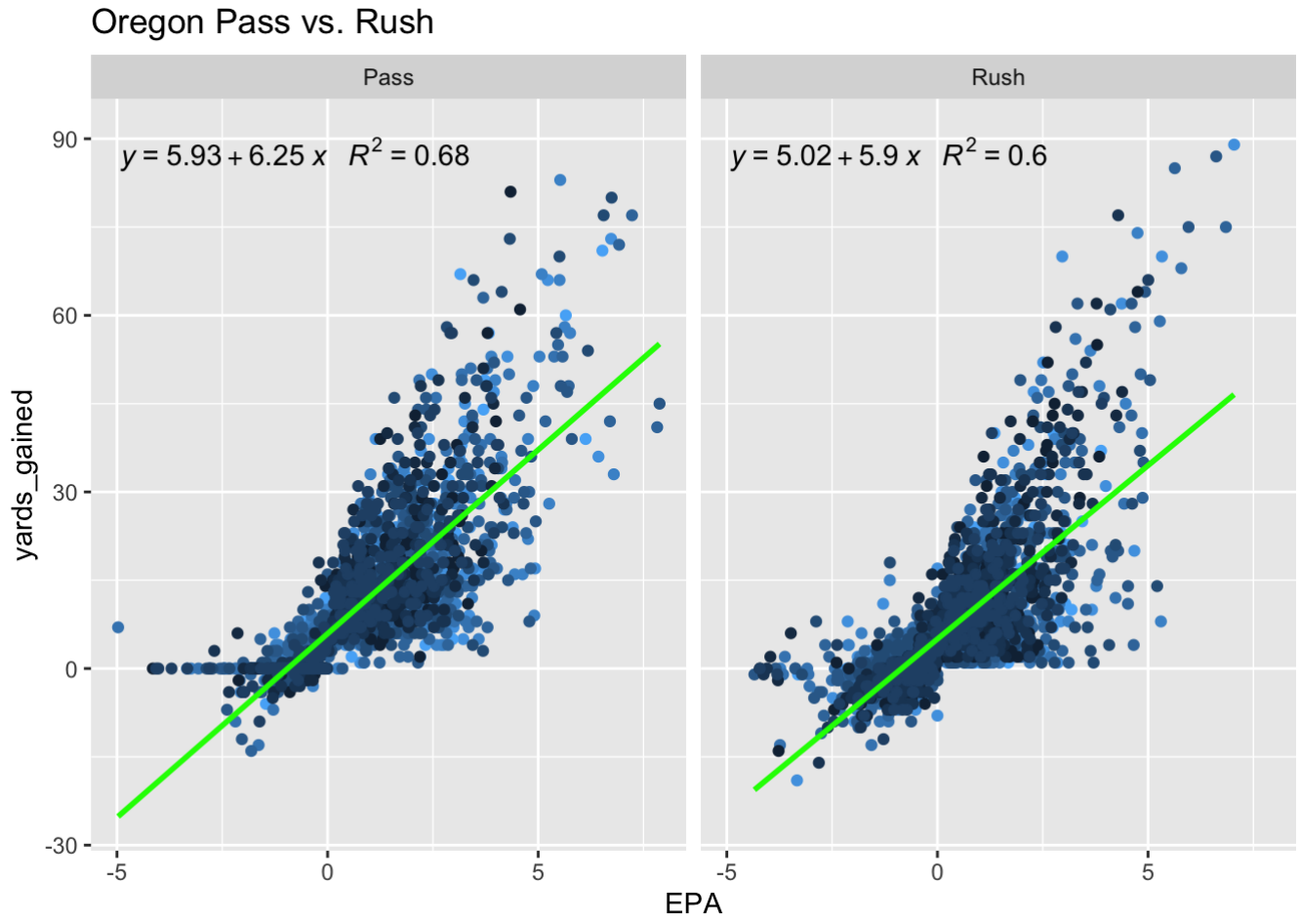
Oregon Running Game vs rest of PAC over time 2010-2020

				EPA		Success Rate		YPC		Plays	
year	pos_team	HC_name	OC_name	Oregon_EPA	PAC12_EPA	Oregon	PAC12	Oregon YPC	PAC12 YPC	Oregon Plays	PAC12 Plays
2010	Oregon	Chip Kelly	Mark Helfrich	0.07	-0.01	0.50	0.44	6.09	4.97	621	3825
2011	Oregon	Chip Kelly	Mark Helfrich	0.15	-0.03	0.50	0.43	6.96	4.83	617	4436
2012	Oregon	Chip Kelly	Mark Helfrich	0.11	-0.01	0.50	0.43	6.30	5.01	666	4786
2013	Oregon	Mark Helfrich	Scott Frost	0.15	0.00	0.53	0.44	6.60	4.99	551	5177

				EPA		Success Rate		YPC		Plays	
year	pos_team	HC_name	OC_name	Oregon_EPA	PAC12_EPA	Oregon	PAC12	Oregon YPC	PAC12 YPC	Oregon Plays	PAC12 Plays
2014	Oregon	Mark Helfrich	Scott Frost	0.17	-0.03	0.47	0.38	6.09	4.95	498	4304
2015	Oregon	Mark Helfrich	Scott Frost	0.16	0.02	0.44	0.42	6.59	5.32	481	4463
2016	Oregon	Mark Helfrich	Matt Lubick	0.10	0.00	0.42	0.41	6.12	5.35	430	4438
2017	Oregon	Willie Taggart	Mario Cristobal/Marcus Arroyo	0.02	0.02	0.43	0.41	5.59	5.29	528	4421
2018	Oregon	Mario Cristobal	Marcus Arroyo	-0.01	-0.01	0.42	0.38	5.08	4.94	437	4278
2019	Oregon	Mario Cristobal	Marcus Arroyo	0.04	0.01	0.42	0.41	5.82	4.92	418	4002
2020	Oregon	Mario Cristobal	Joe Moorhead	0.00	0.03	0.47	0.42	5.99	5.32	209	2031

Comparison to Passing Game Effectivness

We can see the rush effectiveness & yards gained less steeper of a line than the passing attack meaning much more explosiveness came from the rushing attack over the history.



Rushing Attack by Stadium

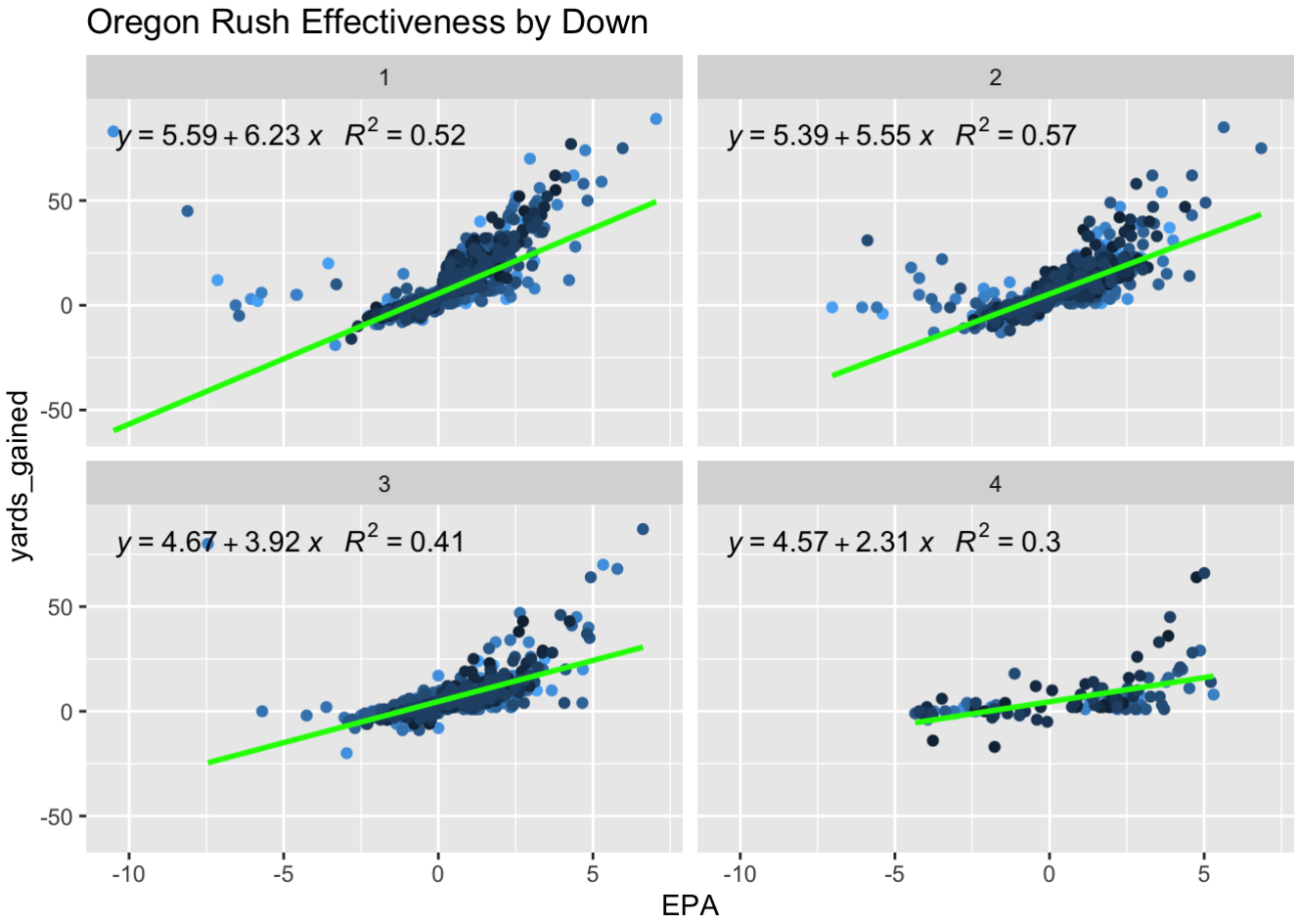
The Ducks are at their best in terms of rushing attack when they head up the I-5 to Reser Stadium where they average nearly 7 yards gained per attempt and have a successful run nearly 50% of the time. The 0.2 EPA means they have a lot of breakout plays at Reser Stadium. The Ducks struggles in running game when traveling to Memorial Stadium, home of Cal Bears and Sun Devil Stadium. The game at Memorial Stadium, home of U of Nebraska was heartbreaking despite Oregon's most success game running the football. Lastly, the AT&T curse is real for the Ducks rushing attack as there is negative Expected points per attempt.

Oregon Running Game by Venue

venue	mean_epa	success_rate	ypc	plays
Autzen Stadium	0.12	0.47	6.37	2875
Reser Stadium	0.20	0.49	6.67	269
Husky Stadium	0.03	0.47	4.93	227
California Memorial Stadium	-0.01	0.44	4.55	218
Los Angeles Memorial Coliseum	0.11	0.50	5.86	204
Sun Devil Stadium	0.03	0.38	6.05	173
Folsom Field	0.16	0.52	6.64	165
Martin Stadium	0.16	0.49	6.56	165
Stanford Stadium	0.03	0.41	5.78	164
Levi's Stadium	0.09	0.45	6.12	139
Rose Bowl	0.07	0.46	6.42	138
Rice-Eccles Stadium	0.06	0.38	6.07	114
Arizona Stadium	0.13	0.48	6.35	109
War Memorial Stadium	0.07	0.49	4.83	63

Rushing Effectiveness by Down

Data on 1st & 2nd down is much more predictably given the R^2 is above 0.5. That being said Oregon was much more efficient running on 1st down then on 2nd down with the a higher amount of yards gained per EPA.



Oregon Rushing on 1st Down

Oregon rushing on 1st down hasn't been much of a thing since Mario Cristobal took over in 2018. It was very much a strategy of Willie Taggart and although not always successful it yield some high explosive plays. 2014 was the 2nd most explosive on 1st down but 2011 was likely to best year overall in ranking of stats overall.

Oregon vs PAC Rushing on 1st down

	EPA		Success Rate		YPC		Plays	
year	Oregon EPA	PAC 12 EPA	Oregon	PAC 12	Oregon YPC	PAC 12 YPC	Oregon Plays	PAC 12 Plays
2010	-0.02	-0.10	0.48	0.41	5.94	4.97	285	1960
2011	0.05	-0.10	0.46	0.41	6.94	4.83	293	2338
2012	0.02	-0.07	0.50	0.42	6.39	5.16	301	2544
2013	0.10	-0.08	0.51	0.41	6.37	4.89	277	2624
2014	0.12	-0.08	0.42	0.33	6.21	4.83	250	2229
2015	0.09	-0.02	0.42	0.37	6.45	5.41	244	2307
2016	0.02	-0.02	0.38	0.35	5.98	5.38	240	2264
2017	0.14	-0.02	0.39	0.35	6.08	5.43	260	2257
2018	-0.09	-0.05	0.35	0.32	4.66	4.85	235	2192
2019	-0.09	-0.04	0.34	0.35	5.75	4.90	229	1974

	EPA		Success Rate		YPC		Plays	
year	Oregon EPA	PAC 12 EPA	Oregon	PAC 12	Oregon YPC	PAC 12 YPC	Oregon Plays	PAC 12 Plays
2020	-0.02	0.01	0.44	0.38	6.18	5.52	110	976

Individual Career Performances

The next session we start to take a look at individual career performances at UO, which is combo between QB/RB and hybrid RB/WR. First thing you notice is the explosiveness of Marcus Mariota and his high success rate. Makes sense given he won the Heisman Trophy in 2014. The fact that per Rushing attempt in the entirety of his career he nearly put a half a point on the scoreboard is as the expected result of his rushing attempt. Per 5 attempts he was the equivalent to a FG kicker. To also add this to perspect, Aaron Rodger's 2020 campaign was EPA per play in modern NFL at 0.35 so 0.6 on the rushing attack shows how prolific he was. Plus he averaged nearly 9 yards gained per attempt on over 230 rush attempts. WILD.

Career High EPA Runners

We can see the QBs are at the top of the efficient runners, which makes sense given the historical read player option variation of the offense. Tony Brooks-James if one of the more efficient runner despite less attempts than Marcus Mariota. Not surprising, De'Anthony Thomas had a relatively high Mean EPA despite low touches, he was the definition of explosiveness in Oregon history and arguably all first team kick return/punt return. LaMichael's data is only based on two seasons of data but arguably his best two seasons in program history. His partner in crime, Kenjon Barner is arguably the more explosive and effective runner of the duo. One note of optimism is Tyler Shough, he was an effective runner off less plays BUT at his rate per season he's likely approaching Marcus Mariota rushing attempts if he was a 4 year starter.

Top Oregon Historical EPA Runners 2010-2020

Rushers	mean_epa	success_rate	ypc	plays	seasons of data
Marcus Mariota	0.60	0.60	9.06	230	4
Justin Herbert	0.26	0.48	7.39	134	4
Bryan Bennett	0.23	0.47	7.06	51	2
Darron Thomas	0.22	0.50	6.41	115	2
Tyler Shough	0.22	0.47	7.00	53	2
Tony Brooks-James	0.16	0.50	6.38	231	4
De'Anthony Thomas	0.16	0.48	6.07	213	3
Kenjon Barner	0.15	0.48	5.34	463	3
Remene Alston Jr.	0.10	0.46	5.61	54	1
Royce Freeman	0.09	0.44	5.95	829	4
Thomas Tyner	0.09	0.48	4.94	179	2
LaMichael James	0.09	0.44	5.50	485	2
Byron Marshall	0.07	0.42	5.44	273	3
Cyrus Habibi-Likio	0.06	0.49	3.43	117	3
CJ Verdell	0.05	0.42	5.77	413	3

Note:
Filtered for Top 15 career

PAC 12 Workhorses

Royce Freeman and Myles Gaskin had a similar career in the PAC 12 with Royce Freem gaining the edge. Ronald Jobes & Christian McCaffrey were the most explosive in their career. Zach Moss could be argued to be the most consistent of the bunch given a high success rate.

Pac12 Workhorses 2010-2020

Rushers	pos_team	mean_epa	success_rate	ypc	plays	seasons of data
Royce Freeman	Oregon	0.09	0.44	5.95	829	4
Myles Gaskin	Washington	0.07	0.42	5.62	818	4
Stepfan Taylor	Stanford	0.01	0.40	4.75	739	3
Ka'Deem Carey	Arizona	0.05	0.44	5.36	679	3
Phillip Lindsay	Colorado	-0.03	0.39	4.88	667	4
Zack Moss	Utah	0.09	0.46	5.67	622	4
Johnathan Franklin	UCLA	0.02	0.43	5.13	620	3
Christian McCaffrey	Stanford	0.11	0.44	6.07	604	3
Bishop Sankey	Washington	0.08	0.42	5.11	595	3
Paul Perkins	UCLA	0.06	0.39	5.40	565	3
Demario Richard	Arizona State	0.01	0.38	5.08	557	4
J.J. Taylor	Arizona	0.02	0.39	5.70	546	4
Ronald Jones II	USC	0.12	0.43	6.37	543	3
Eno Benjamin	Arizona State	0.05	0.43	5.02	524	3
Bryce Love	Stanford	0.08	0.35	6.94	519	4

Note:
Top 15 by Career Rushes

We can see that PAC 12 QBs dominate the EPA given their overall efficiency. It may be something to say that Arizona's running game was may explosive with a running QB than their primary back. Not surprising Marcus Mariota was one of the most explosive QBs in the past decade in terms of rushing attack. Surprising that Max Borghi (the sole Running back below) was the most explosive runner given he was in an air raid offense.

Top Pac12 EPA 2010-2020

Rushers	pos_team	mean_epa	success_rate	ypc	plays	seasons of data
Marcus Mariota	Oregon	0.60	0.60	9.06	230	4
Brandon Dawkins	Arizona	0.49	0.53	8.97	162	3
Jake Browning	Washington	0.38	0.53	4.84	152	4
Jayden Daniels	Arizona State	0.38	0.45	7.13	108	2
Chase Garbers	California	0.35	0.49	7.22	138	3
Matt Scott	Arizona	0.34	0.61	6.35	115	2
Khalil Tate	Arizona	0.31	0.48	8.78	288	4
Steven Montez	Colorado	0.28	0.49	6.28	233	4
Kevin Hogan	Stanford	0.26	0.50	6.76	232	4

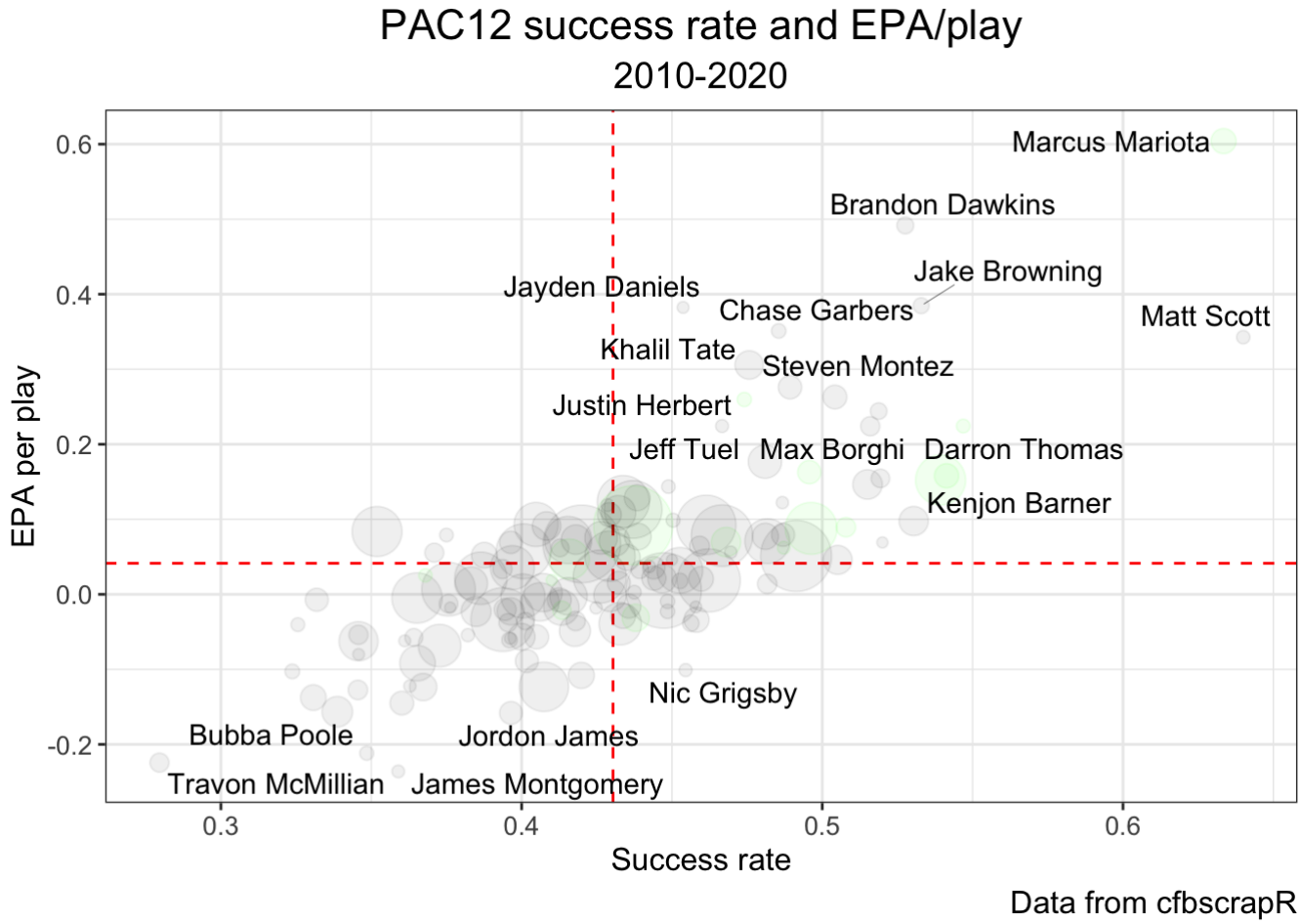
Note:
Top 15 EPA or explosive runners

Rushers	pos_team	mean_epa	success_rate	ypc	plays	seasons of data
Justin Herbert	Oregon	0.26	0.48	7.39	134	4
Dorian Thompson-Robinson	UCLA	0.24	0.52	7.01	160	3
Darron Thomas	Oregon	0.22	0.50	6.41	115	2
Jeff Tuel	Washington State	0.22	0.45	5.34	116	3
Max Borghi	Washington State	0.22	0.52	6.56	188	3
Brett Hundley	UCLA	0.18	0.44	5.75	314	3

Note:
Top 15 EPA or explosive runners

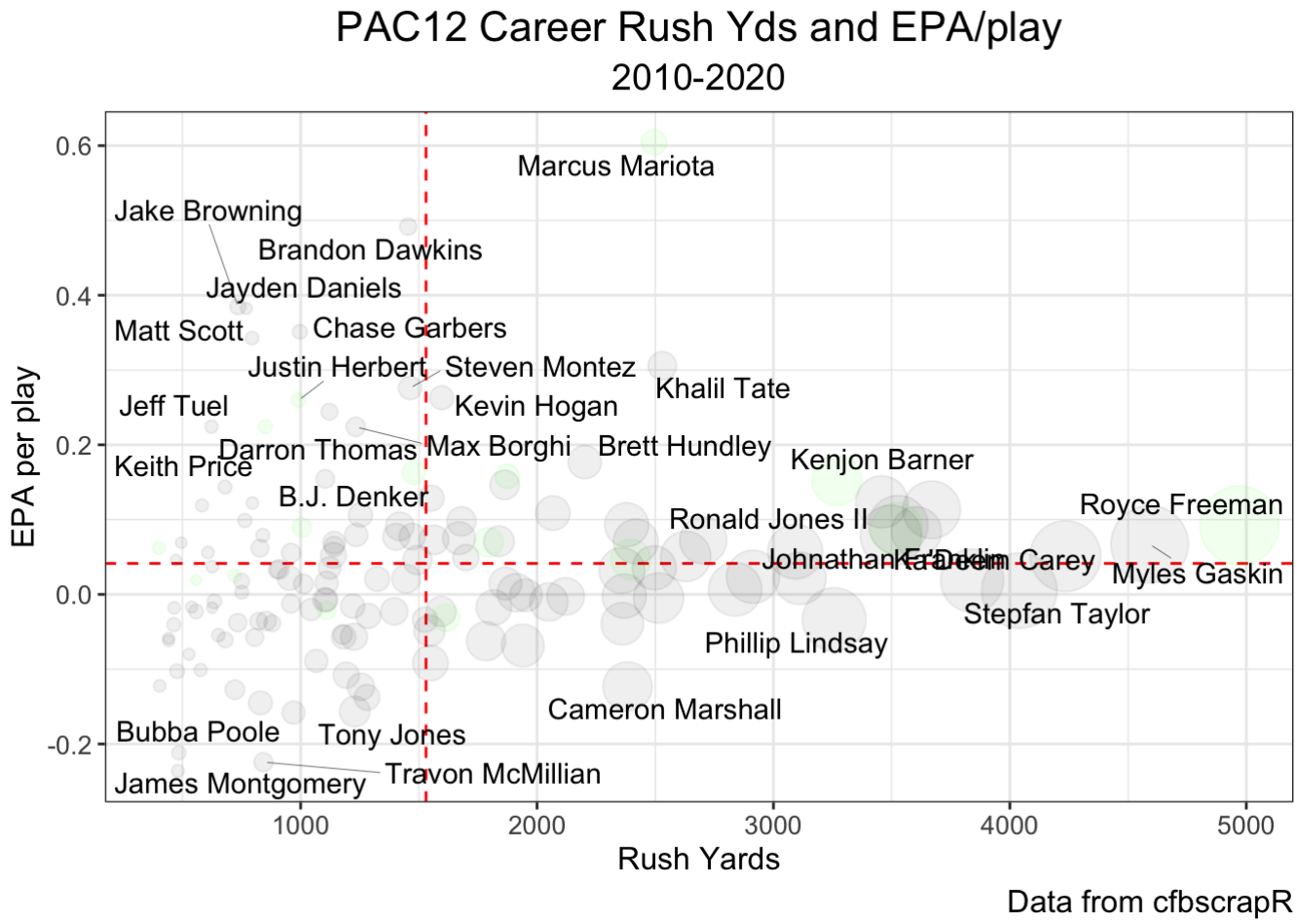
PAC12 EPA v Success Rate

This next section charts their explosiveness (EPA) around their success rate. We can see the clear separation of Marcus Mariota. In fact all Oregon runningbacks are colored in green below. One obvious question is will Oregon ever get a gamechanging runner like Marcus Mariota? Justin Herbert's 2019 Rose Bowl performance (3 Rushing TDs) left a big what-if for a lot of Oregon Duck fans.



PAC12 Career Rush Yds vs. EPA

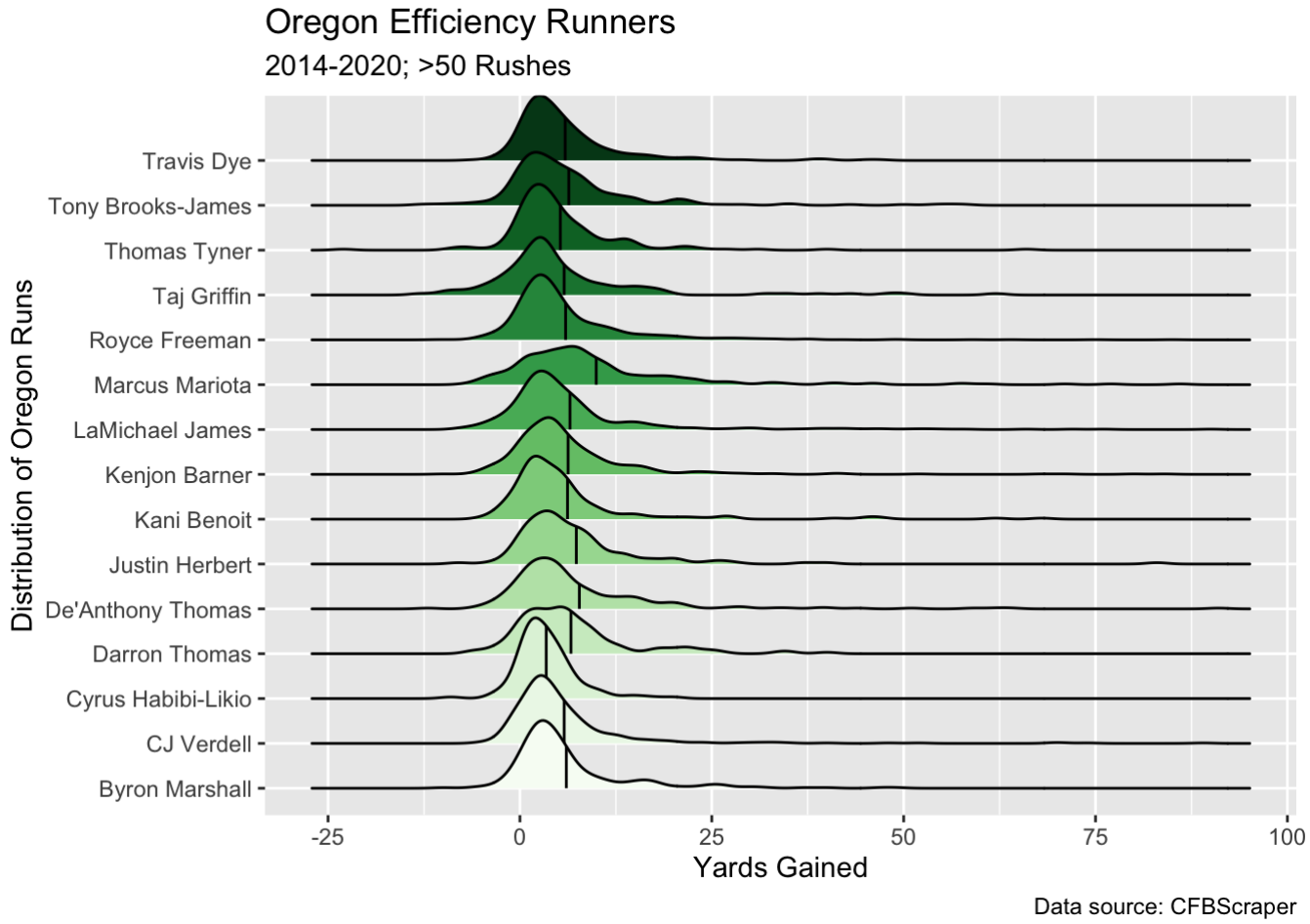
We can see the overall consistency of Royce Freeman and Myles Gaskin, which made for a great rivalry the years they squared off. Again, notice Marcus Mariota's explosiveness compared to other players on the chart below.



Yards Gained Distribution

The charts show average distribution comparison of yards gained per Rushers. One interesting observation, which was confirmed above the clear higher than average attempt of Marcus Mariota. His distribution of runs featured more break away, explosive gains than others. Not surprisingly. Justin Herbert and De'Anthony Thomas

averaged had a similar distribution of yards gained, which is interested given their physiques are a stark contrast from each other.



Individual Oregon Season Performances

Mariota's 2014 season was clearly superb and big reason for why he won the Heisman. The fact he makes up the top 3 explosive running season is purely phenomenal. 2011 Rose Bowl was largely driven a high efficient attack of many runners. CJ Verdell's 2020 was not good whatsover as it was a stark difference from his 2019 season where his draft stock was rising. His decision to return, we'd hopefully like to see his 2019 season and not his 2020 season (hampered by injuries)

Oregon Annual Efficient Running Seasons

rusher_player_name	year	mean_epa	success_rate	ypc	plays
Marcus Mariota	2014	0.91	0.67	9.85	82
Marcus Mariota	2013	0.52	0.60	9.26	65
Marcus Mariota	2012	0.38	0.54	8.27	82
Tony Brooks-James	2016	0.33	0.55	6.96	95
Darron Thomas	2010	0.26	0.51	6.40	73
Tyler Shough	2020	0.22	0.48	6.88	52
LaMichael James	2011	0.16	0.46	6.42	223

Note:
Top 15 Oregon rushing season or explosive runners

rusher_player_name	year	mean_epa	success_rate	ypc	plays
Thomas Tyner	2013	0.16	0.54	5.36	102
Kenjon Barner	2011	0.16	0.47	5.19	134
Kenjon Barner	2012	0.15	0.50	5.54	249
Royce Freeman	2015	0.15	0.46	6.47	230
Cyrus Habibi-Likio	2019	0.14	0.43	4.00	83
De'Anthony Thomas	2012	0.14	0.44	5.23	78
CJ Verdell	2019	0.14	0.41	6.76	175
Byron Marshall	2012	0.14	0.40	5.23	81

Note:
Top 15 Oregon rushing season or explosive runners

Predicting Future Oregon Rushing Seasons

we will try to predict rushing attack for players on the roster next year. After some trial and error we found that mean_epa, ypc, games (career games played), yards_game would yield a 98% R-squared and a p-value less than 0.05, which is a sufficient bare bones model.

```
##
## Call:
## lm(formula = yards ~ mean_epa + ypc + games + yards_gm, data = oregon_Pred)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -135.117  -22.117   -9.029   31.975   94.867
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) -432.3352    52.8522  -8.180 2.64e-10 ***
## mean_epa      35.2041    54.9252   0.641   0.5250
## ypc          -13.2235     7.7905  -1.697   0.0969 .
## games         47.8524     3.3651  14.220  < 2e-16 ***
## yards_gm      10.9570     0.2507  43.698  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 46.04 on 43 degrees of freedom
## Multiple R-squared:  0.9863, Adjusted R-squared:  0.985
## F-statistic: 772.8 on 4 and 43 DF,  p-value: < 2.2e-16
```

Predicting 2021 Oregon Rushing Attack

We predict Tyler Shough to rush close to 800 yards, which we think he can easily hit given he rushed for 400 yards in a hqlf q season. CJ Verdell at nearly 1,100 yards would be nearly on par with his 2019 season. We don't think that will having even with the other two scenarios reducing their mean EPA (80% of their career average) and Yards per game (70% of career average). Sean Dollars showed a lot of promise and he will most certainly eat carries from Travis Dye (~816). Travis Dye is very high given he solely rushed in 2020 given CJ's injury. We'd be estatic if they both rushed over 1,900 yards but the unknown variable of Sean Dollars and if Anthony Brown will start may eat rush yards from all of them.

2021 Oregon Predicted Rushing Yards

Rushers	games	Predicted Rushing Yards	Predicted Rushing Yards @ 80% EPA	Predicted Rushing Yards @ 70% Yards/GM
Tyler Shough	15	781.3	779.8	605.6
Travis Dye	15	816.6	816.8	633.8
CJ Verdell	15	1144.0	1143.7	863.7

Note:
Missing Anthony Brown & Sean Dollars; not sufficient enough samples size. Predicted Rushing Yards @ 80% EPA takes 80% of runners expected play average, Predicted Rushing Yards @ 70% Yards/GM takes 70% of runners yards per game to account for Anthony Brown and Sean Dollars rushing