# University of Washington Football Analysis

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## Introduction

This project focused on the 2023 Washington Huskies' football team. The goal of this project was to analyze Washington's team data to see how they would match up against the likes of Georgia, Ohio State, Florida State, and Michigan, who are some of the other top ranked teams in the country. Since the college football regular season is winding down and teams are jockeying for playoff positioning, this is a very relevant and interesting problem. How will a team like Washington match up against the best of the best? Do Michigan and Georgia deserve to be #1? These and many similar questions are asked on an everyday basis on social media, news, and by everyday football fans. This project looks to use data rather than biases to compare them.

Washington was selected based on a variety of factors. Washington has a chance of making the college football playoff, they potentially have media bias against them[6], and have an interesting strength of schedule. Washington does not play the vast majority of CFP title contenders which makes them harder to compare to the other top teams. Also Washington is not a typical "blue blood" of college football so they might be misrepresented in the College Football Rankings unlike the other teams we are looking at. [5][3].Thus, there are a lot of questions about how a potential matchup between Washington and these other contenders would turn out, especially if they play in the College Football Playoff [6].

To analyze the matchups between Washington and the other schools, rushing and passing Expected Points Added (EPA) per play for offense and defense were used[4]. This data was obtained by the R package "cfbfastR" and cleaned in order to get the play by play data into team by team summaries. In order to factor in their schedules, strength of schedule was also taken into account. As mentioned these five teams played a vastly different regular season schedule and had differing levels of opponent toughness. Weighing the EPA using their opponents EPA created an even playing field and this was the heart of the analysis.

From this, visuals were created that compared Washington's strengths and weaknesses to the rest of the teams. These visuals helped show how Washington stacked up against all the teams without the fear of weaker/stronger opponents skewing the data. Finally, passing and rushing for Washington vs each team was done. These metrics were weighted by comparing the offense of Washington to the opponent's defense and vice versa.

In terms of EPA, Washington initially looked to have the best offensive and the worst defensive performances. After weighting based on opponents, it turned out that Washington's offensive was not the best in both passing and rushing due to its weaker defensive opponents. On the other hand, their defense still looked to be the worst out of the bunch even though they played a tough offensive schedule.

After using the weighted offense and defense for this analysis, the matchup analysis showed that Washington looked to struggle against Ohio State, Michigan and Georgia, but were relatively even with Florida State.

**Related work**

The question of ranking teams vs other teams without having head to head or an overlapping matchup is not new. Metrics known as "Strength of Schedule" and "Football Power Index" (FPI) have been invented to attempt to solve this problem [2]. ESPN and other sports outlets have analyzed this metric and many other metrics to judge the caliber of opponents that teams have faced.[2] The College Football Playoff Committee that releases the rankings are supposed to take strength of schedule and the quality of their top wins into account but often recent bias, tradition, and other factors get in the way of ranking teams.[5] Washington has a win vs Oregon (top 6 win) in the nation (the highest ranked win by any team minus Michigan) (And they were ranked below Michigan even before Michigan had this win) and is undefeated but yet is still behind teams like Georgia and Ohio State (until OSU lost to Michigan and Georgia lost to Alabama).[3] This project looks to analyze strength of schedule based on Expected Points Added[4] by their top opponents and judge how Washington looks on both sides of the ball against the other top teams with their opponents taken into account. This is just one metric and one approach to this big problem but this project looks to help remove bias and keep each team on a level playing field for comparison.

**Methods**

First, the teams to be used in the model were selected. Washington, Michigan, Ohio State, Florida State, and Georgia were chosen because they were the top four teams in the nation at the time. Washington's football team was going to be compared to the other FBS schools throughout the nation, but specifically against the other four top teams. The five teams in question were compared to the rest of the field in offensive passing and rushing EPA per play and then also defensive passing and rushing EPA per play. GGPlot was the function used in R to graphically represent these five teams on a grid for comparison for both sides of the ball. The initial EPA graphs were analyzed and in doing so, raised the question of strength of schedule. Since these teams played in different conferences, and therefore played vastly different opponents, the quality of these respective teams' opponents had to be taken into consideration. Therefore, the 7 to 9 Power 5 opponents each team had played (at the time) had their offensive and defensive EPA statistics extracted. These numbers were then averaged out for the five teams chosen. The opponent's averages for both sides of the ball were plotted in the same way as before for easy comparison. These visuals then could be used as a measure and comparison for each team's strength of schedule on both sides of the ball. Next these two sets of graphs were combined to showcase how each team performed on offense and defense, with respect to their strength of schedules. Thus, a third pair of graphs was created and analyzed using a custom weighted formula to penalize/reward teams for playing strong/weak offensive and defenses. These two graphs most accurately portrayed the offensive and defensive prowesses of these top teams by

putting all five teams on an equal playing field.  Below is a sample of the weighted formula.

Formula:
weighted_passing_off = 10*((1/(0.5+opp_pass_epa_per_play_def))*(pass_epa_per_play+0.5))
weighted_rushing_off = 10*((1/(0.5+opp_rush_epa_per_play_def)) * (rush_epa_per_play+0.5))
weighted_passing_def = 10*((1/(0.5+opp_pass_epa_per_play)) * (pass_epa_per_play_def+0.5))
weighted_rushing_def = 10*((1/(0.5+opp_rush_epa_per_play)) * (rush_epa_per_play_def+0.5))

Finally, using another weighted formula, each potential matchup for Washington was analyzed based on their weighted EPAs. Factoring all of this in, bar charts were created that illustrated how Washington would match up against the other four elite schools. Four bars were included on each graph: two that indicated how Washington would fare on rushing and passing against said team and then two more that indicated how the opposing team in question would stack up against Washington. Using these graphs, Washington's best plan of attack against these four other teams was devised, with recent injuries and development in mind.

The below formula is what we used to determine the Wasington's offensive epa for rushing and passing, while comparing it to the chosen opponent. This formula takes the offensive EPA and either multiplies it by the opponents defense EPA in that area. Therefore a higher value for a team is ideal. By adding 0.5 to the epa values, this makes the values all positive, and multiplying by 10 makes the values bigger and easier to view.

Formula:
weighted_passing_off = 10*((1/(0.5+opp_pass_epa_per_play_def))*(pass_epa_per_play+0.5))
weighted_rushing_off = 10*((1/(0.5+opp_rush_epa_per_play_def)) * (rush_epa_per_play+0.5))
weighted_passing_def = 10*((1/(0.5+opp_pass_epa_per_play)) * (pass_epa_per_play_def+0.5))
weighted_rushing_def = 10*((1/(0.5+opp_rush_epa_per_play)) * (rush_epa_per_play_def+0.5))

**Discussion**

From the initial graphs, a couple basic insights were gained. The initial offensive visual of EPA per play showed that Washington had the best overall offense out of the five schools in question, as it had a strong passing game as well as a great rushing attack. Furthermore, Georgia had the strongest rushing attack, but had one of the weaker passing games. This was opposite of Michigan who had the best passing attack, but had a relatively weaker run game. Florida State had the weakest overall attack, in both passing and rushing. Ohio State had a weak running game and an average passing game. Washington was the only team out of the five that had a good

balance between their rushing and passing. In Appendix A:, the visual of the offensive EPA for each team is shown.

On the defensive side of the ball, Washington struggled. It had the worst passing and rushing defense by a large margin. Michigan and Ohio State both had really strong defenses and were the best passing and run defenses by a wide margin over Florida State and Georgia. Georgia and Florida State both had relatively average defenses, with both of them being slightly better against the pass than against the run. The fact that Washington had the best offense and worst defense, both by wide margins suggests that there may be a confounding variable in play. Washington plays in the PAC 12 conference, which usually boasts high scoring offensive shootouts that have very little defense played. On the other hand, Michigan and Ohio State both play in the BIG 10 conference, which typically have very low scoring games, as they play in cold and windy Midwest games that make it hard to throw the ball effectively. Thus, strength of schedule and the quality of opponents these teams played needed to be accounted for to get a more accurate depiction on the strengths and weaknesses of these teams. In Appendix B:, the visual of the Defensive EPA for each team is shown.

The next step in order to take the schedule out of the bias, was to take the data for the top schools teams each of these teams played throughout the course of the season (up till week 11). An initial look at the offenses these teams faced showed that Washington faced the toughest offenses, both in terms of rushing and passing. On the other hand, Michigan faced the weakest offenses by a wide margin, suggesting that their strength of schedule for opposing offenses was much easier than that of the other teams. Georgia faced the toughest passing attacks out of these teams, but faced average rushing attacks. Florida State faced tough run games but only faced average level passing attacks, which makes sense considering that there aren't currently many elite quarterbacks in the ACC. Ohio State was in the center of the graph, suggesting that the offenses they faced were average, but significantly better than BIG 10 foe Michigan. In Appendix C:, the visual of the opponents offensive EPA for each team is shown.

Like Washington's defensive graph, Washington's opponents had the weakest defenses out of the lot, followed closely by Georgia. This supports the earlier theory that Washington's numbers may be skewed both offensively and defensively because of the nature of the PAC 12s high scoring affairs. Meanwhile, Ohio State and Michigan faced the toughest defenses out of the five schools, also supporting the theory that these two schools' numbers were skewed negatively by the nature of the BIG 10s low scoring slugfests. In Appendix D:, the visual of the opponents defensive EPA for each team is shown.

Upon accounting for the strength of the schedule the weighted offense and defense metrics were created. The graph showing the weighted offenses showed that Michigan actually boasted the strongest passing game out of the five, while Georgia featured the weakest passing

attack. This is very different from what the normal EPA showed. Georgia and Washington had the strongest rushing attacks, while Ohio State had the weakest ground game. On the defensive side, Washington still had the weakest defense, and Ohio State seemed to have the strongest overall defense out of the five clubs. Michigan was the best at stopping the run, while Florida State and Georgia were susceptible against the run. Georgia and Ohio State featured the best pass defenses out of the bunch, courtesy of their deep defensive line and secondary rooms. The weighted offensive and defensive were different enough from the normal EPA on both sides of the ball to be worthwhile for analysis. For some teams it did not affect them as much as others but it did prove that the opponents do have a substantial impact on the EPA. Therefore looking solely at the offensive and defensive EPA without taking opponents into account can produce skewed results. In Appendix E:, the visual of the weighted offense for each team is shown and in Appendix F: the weighted defense for each team is shown.

Looking at Washington matching up against the two BIG 10 blue bloods, they do not seem to fare well against each of them, on paper. Ohio State has a significant advantage over Washington in both the running and passing games. The X factor in this matchup would be Marvin Harrison Jr. The likely Biletnikoff winner, the most outstanding receiver in American college football, will look to put his fingerprints all over this game. If Washington wants any chance of winning, they will have to neutralize the star wideout. Washington will also need to see huge production from their Heisman candidate quarterback, Michael Penix Jr, in this matchup. Washington will have a tough time shutting down the Ohio State's passing and rushing with their weak defense, so their best bet is to win in a shootout buoyed by their explosive offense. Unfortunately for Washington this looks to be a tough task as Ohio State's defense looks to be the best passing defense and 2nd best rushing defense of the bunch. In Appendix G:, the visual of Washington vs Ohio State is shown.

Washington seems to fare a little better against Michigan, as it looks like their passing game will be at a huge advantage in this game. Michigan is very good at stopping the rush but worse to mediocre at stopping the pass. Having one of the premier quarterbacks in the nation will amplify this in their attempt to hang with this powerhouse. Unfortunately, Washington will have a tall order on the defensive side and one they probably will not fair well against. Michigan features one of, if not the, best running backs in the nation, Blake Corum, and will have to keep him at bay if they want to stand a chance in this one. With Michigan's already strong passing game, this run game could make Michigan's total offense unstoppable for Washington. In Appendix H:, Washington vs Michigan is shown.

Interestingly, Washington matches up with the other two top teams better than the ones previously mentioned. The matchup with Florida State is almost even, with Florida State's run game and passing game only having a slight advantage. This game looks to be interesting as Florida State's weakest offense will go against Washington's weakest defenses. Still it would

seem that again if Washington wants to win this game they will have to look to score early and often for fear their defense will not hold up. Of course, since this data was collected, a big setback to Florida State occurred, with the Seminoles losing their star quarterback Jordan Travis for the rest of the season in week 11. The Huskies will still have a tough task defeating Florida State, but it will be significantly easier without having to face Travis. The Huskies can focus their attention on stopping the Seminoles running game by stacking the box and daring backup quarterback Tate Rodemaker to beat them. Washington can also lean on their run game more in this contest to attack Florida State's weaker run defense. In Appendix I:, the visual of Washington vs Florida State is shown.

Lastly, against the two time defending national champion, the Georgia Bulldogs, Washington actually matches up relatively well, especially compared to the BIG Ten schools. Their run game should be effective in this contest, as Georgia's run defense is not as good as it has been in years past. However, Penix might have his toughest task of the season against Georgia's strong pass defense. With Penix' individual greatness he can still do some damage to the passing defense, as Georgia hasn't seen a talent quite like him this season yet. The key to this game for Washington, however, will be slowing the Georgia ground game. Although Georgia does not have the marquee back that they have had in past seasons, they have a quality run game with the two-headed snake of Daijun Edwards and Kendall Milton. If Washington wants to maximize their chance of unseating the defending champs, they will need their run game to show up and keep Georgia's offense off the field and tire out their defense. The Huskies will also need their potential Heisman quarterback to show up and make timely throws to keep the Bulldogs defense on their heels. In Appendix J: , the visual of Washington vs Georgia is shown.

**Conclusion**

Washington will have tough sledding against all four of these staples of the college football rankings and look to be the underdog in all four matchups. They will need their best players Michael Penix Jr, Dillon Johnson, and Rome Odunze to play their best to unseat these giants. The Huskies will also need timely stops and takeaways from their much maligned defense if they want to slow down these four offenses. Washington should hope to play Florida State and Georgia before Ohio State and Michigan but upsets do happen and the Huskies do have star talent. But from the above analysis, it looks like the CFP rankings got it right by ranking these teams ahead of Washington when they were all undefeated and ranked.

From the information and formulas that we gathered, the next steps would be to analyze other teams from our work. We could look at other key matchups to predict power five champions, bowl matchups, and the national championship game. We could also use all the metrics given to us in the stat table instead of just using epa. EPA value is good to look at to identify overall offensive and defensive effectiveness, but all the metrics would be a better gauge. WPA and total EPA especially could factor in to help us identify overall value.

**Contributions**
Jack Arbuckle: Main R Man, Introduction, Related Work, Editing: 33%
Reuben Dayal: Discussion, Methods, Slides: 33%
Ian Pezzella: Conclusion, Methods, Slides: 33%

**Bibliography**
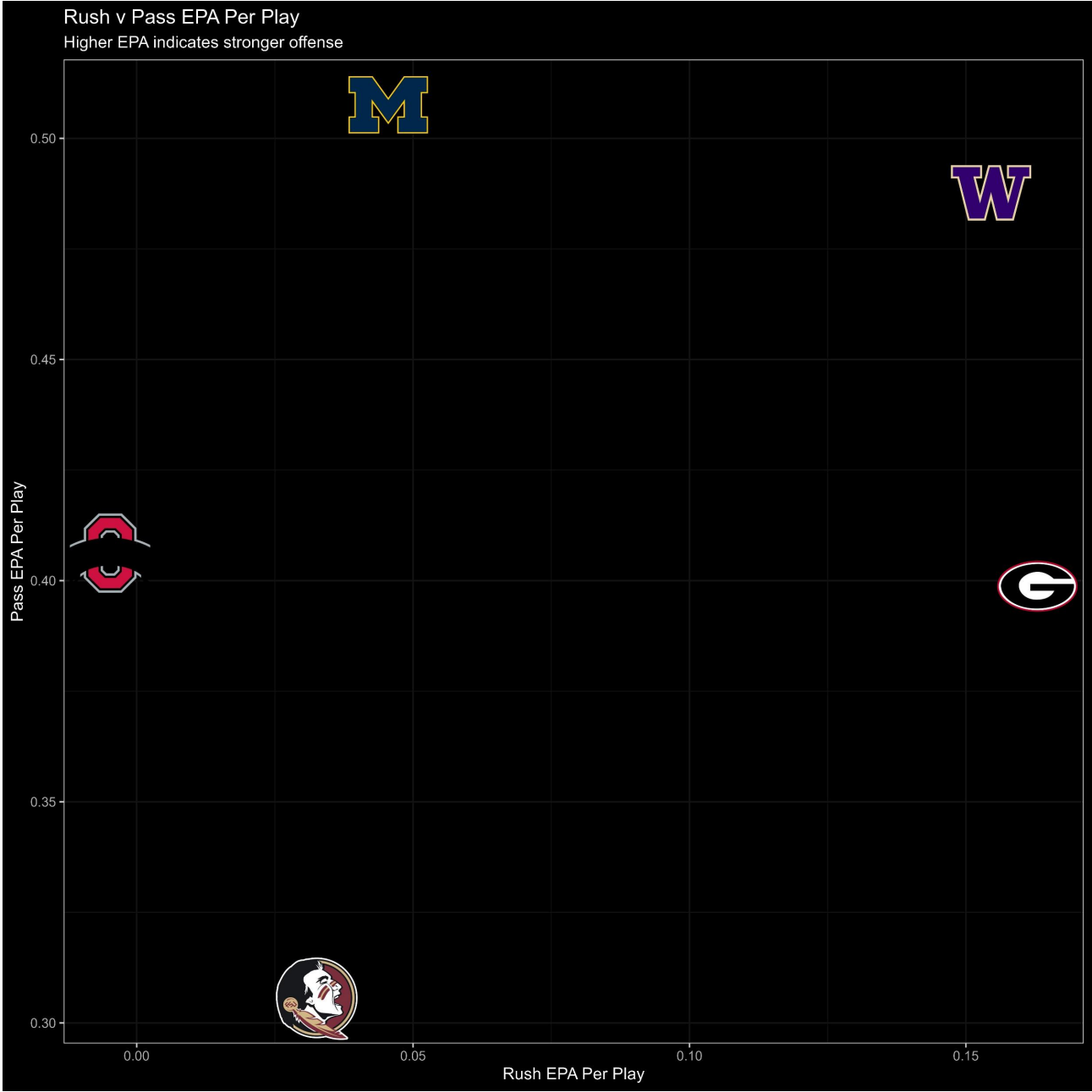https://www.espn.com/college-football/rankings [1]
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Appendix A:



Rush v Pass EPA Per Play
Higher EPA indicates stronger offense

Appendix B:



Rush v Pass EPA DEF Per Play
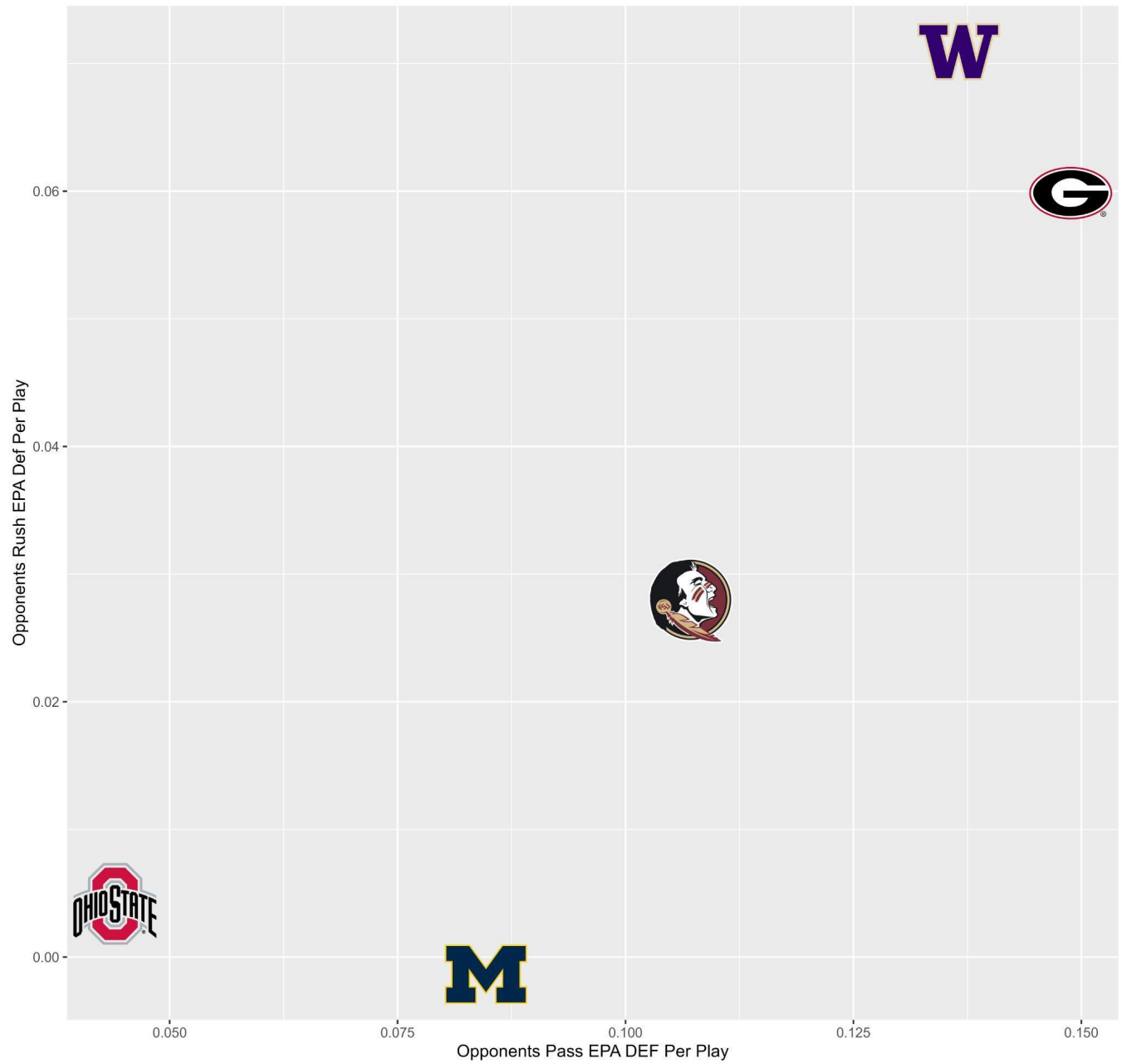Lower EPA indicates stronger defense
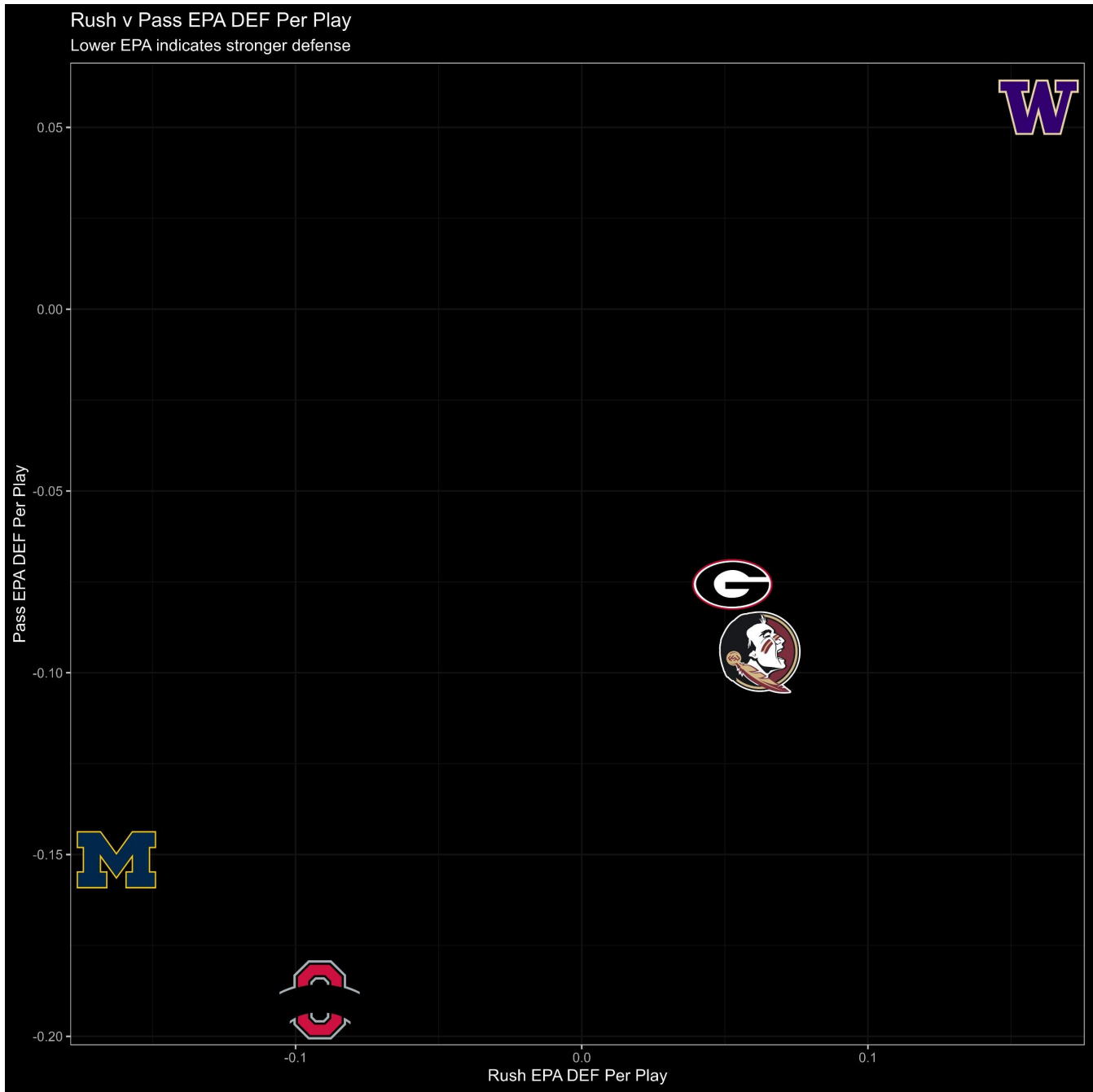
## Appendix C:

Opponents: Rush v Pass EPA Per Play

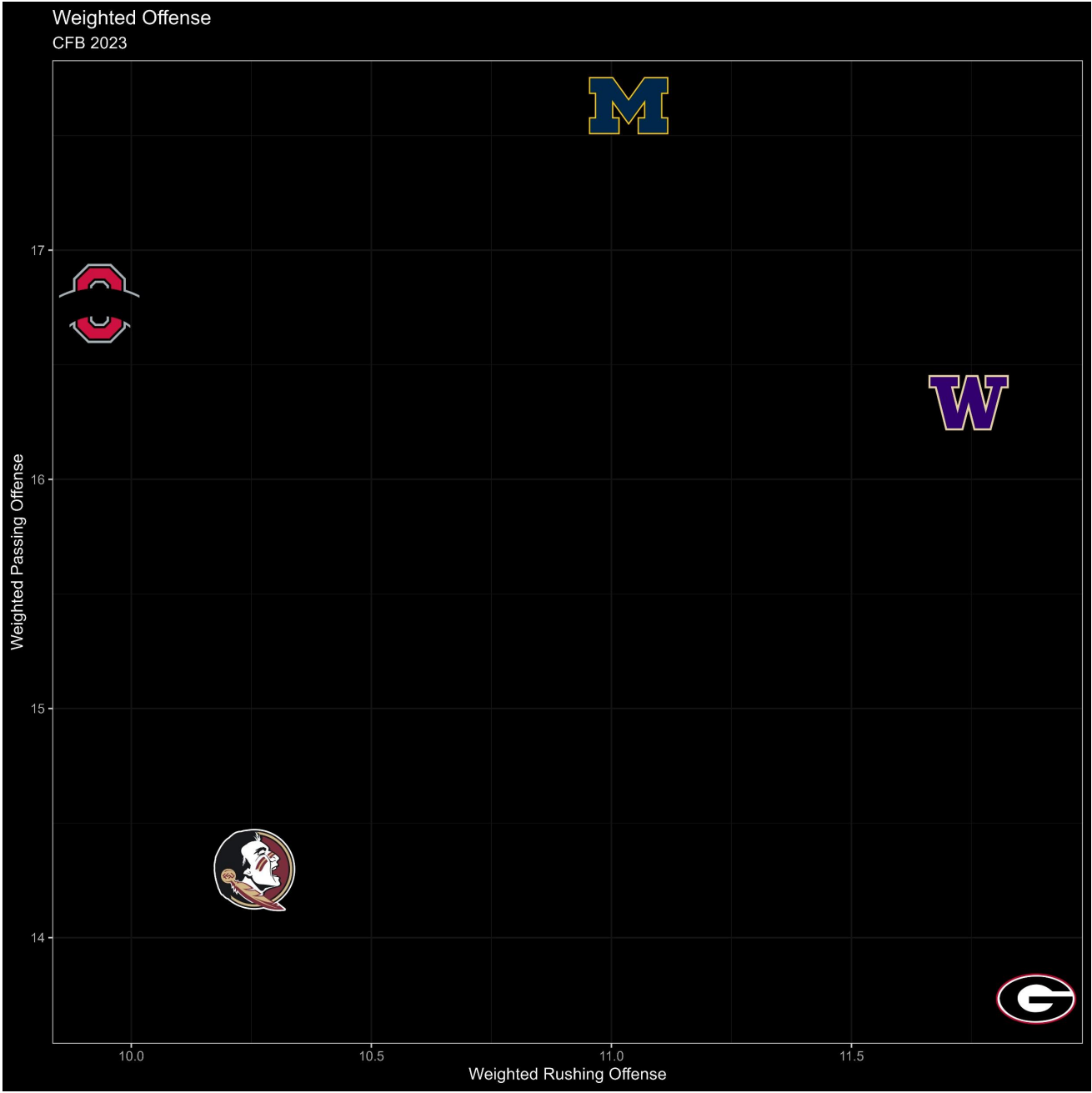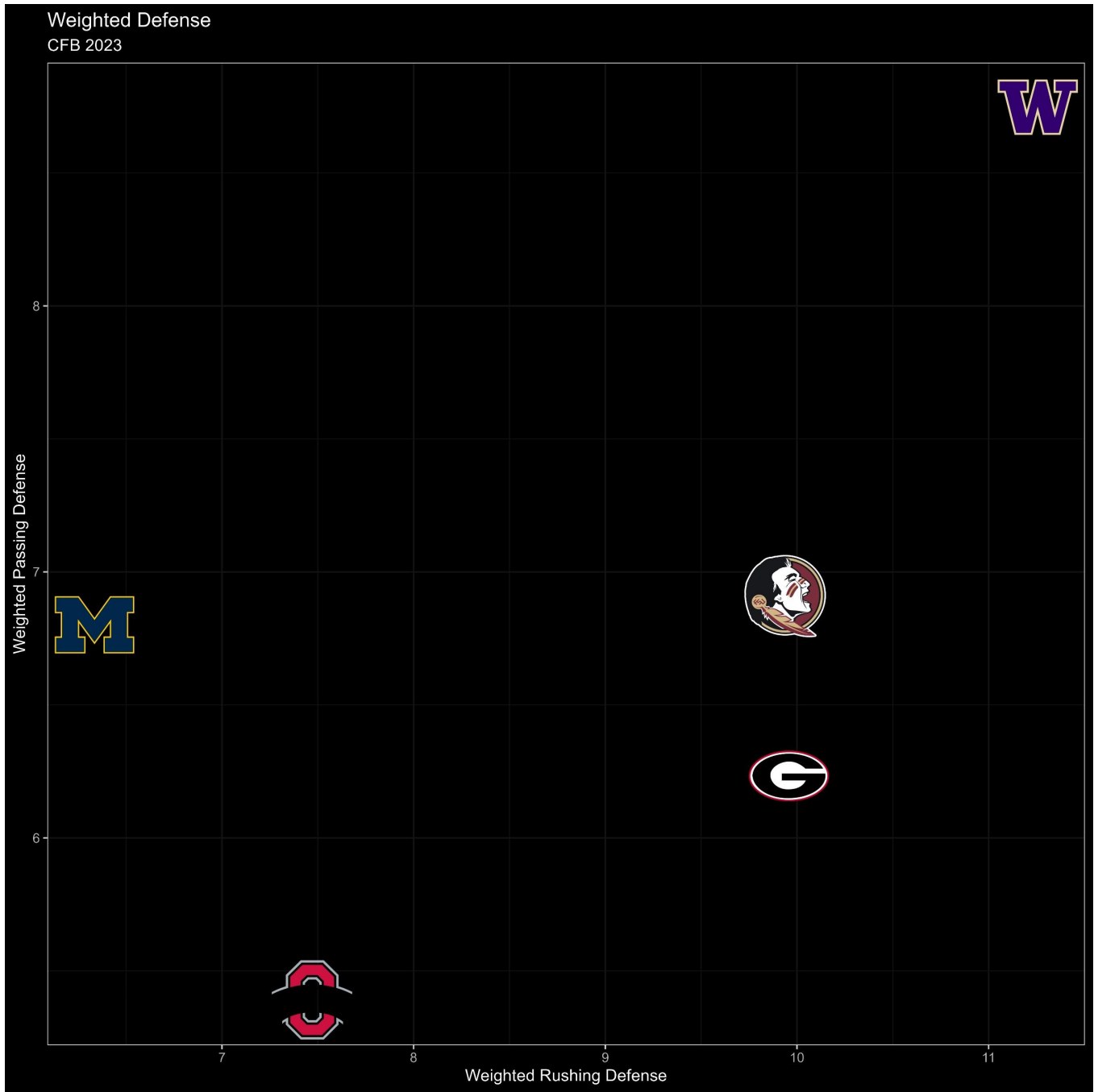Higher EPA indicates team has played stronger offenses
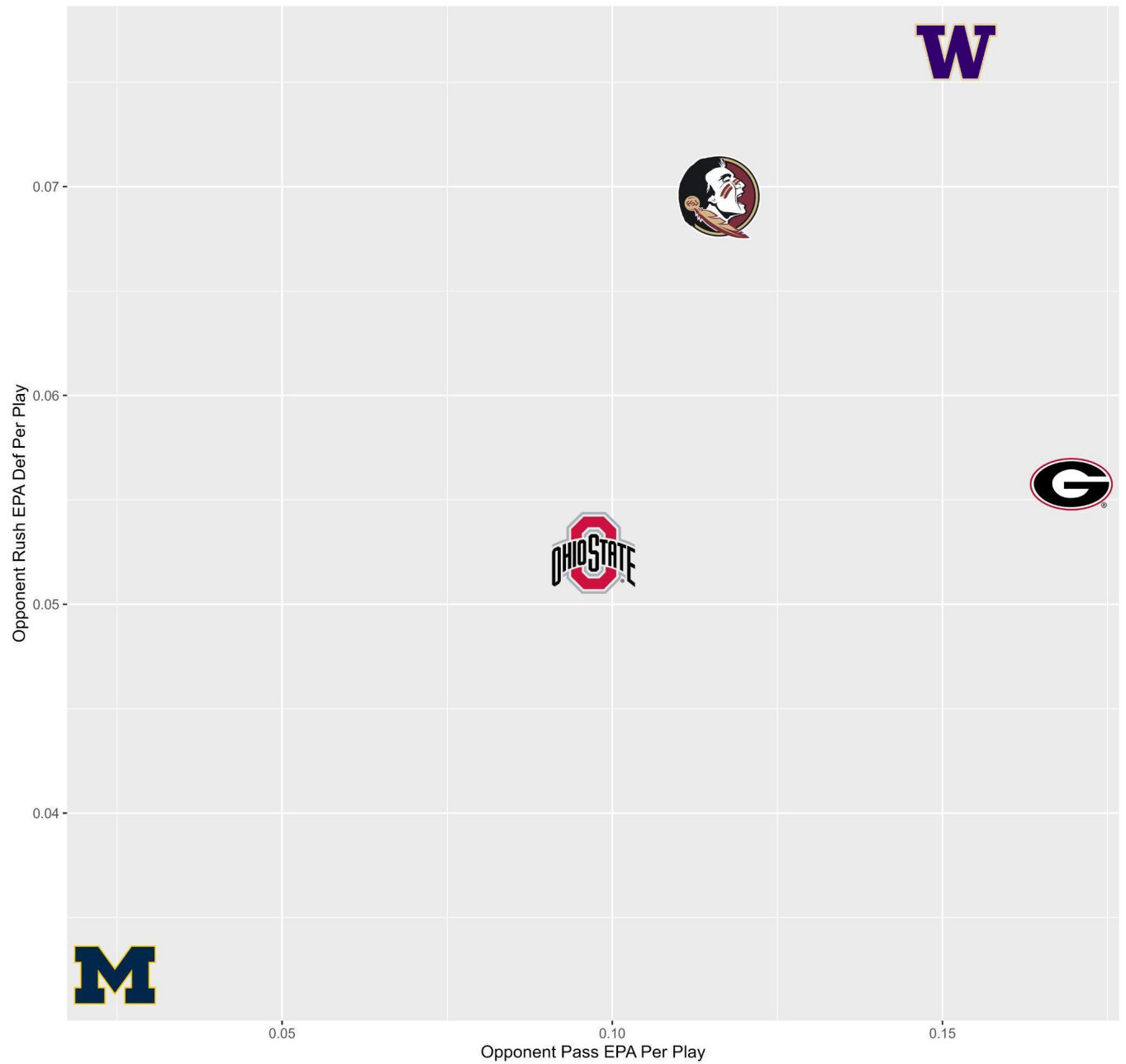
Appendix D:

Opponents: Rush v Pass EPA Def Per Play
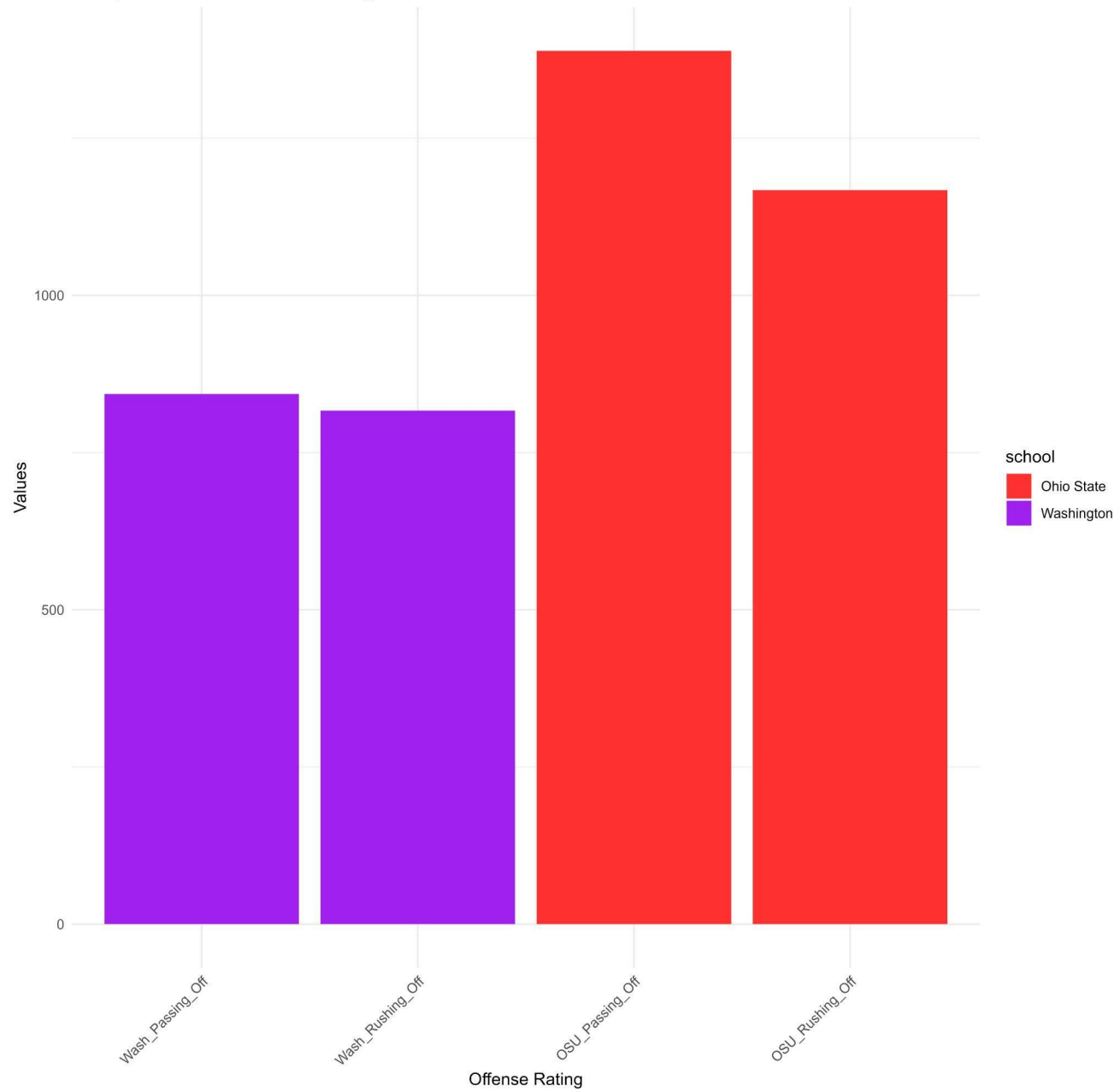Higher EPA indicates team has played weaker defenses

Appendix E:

Appendix F:



Weighted Defense
CFB 2023

Weighted Passing Defense
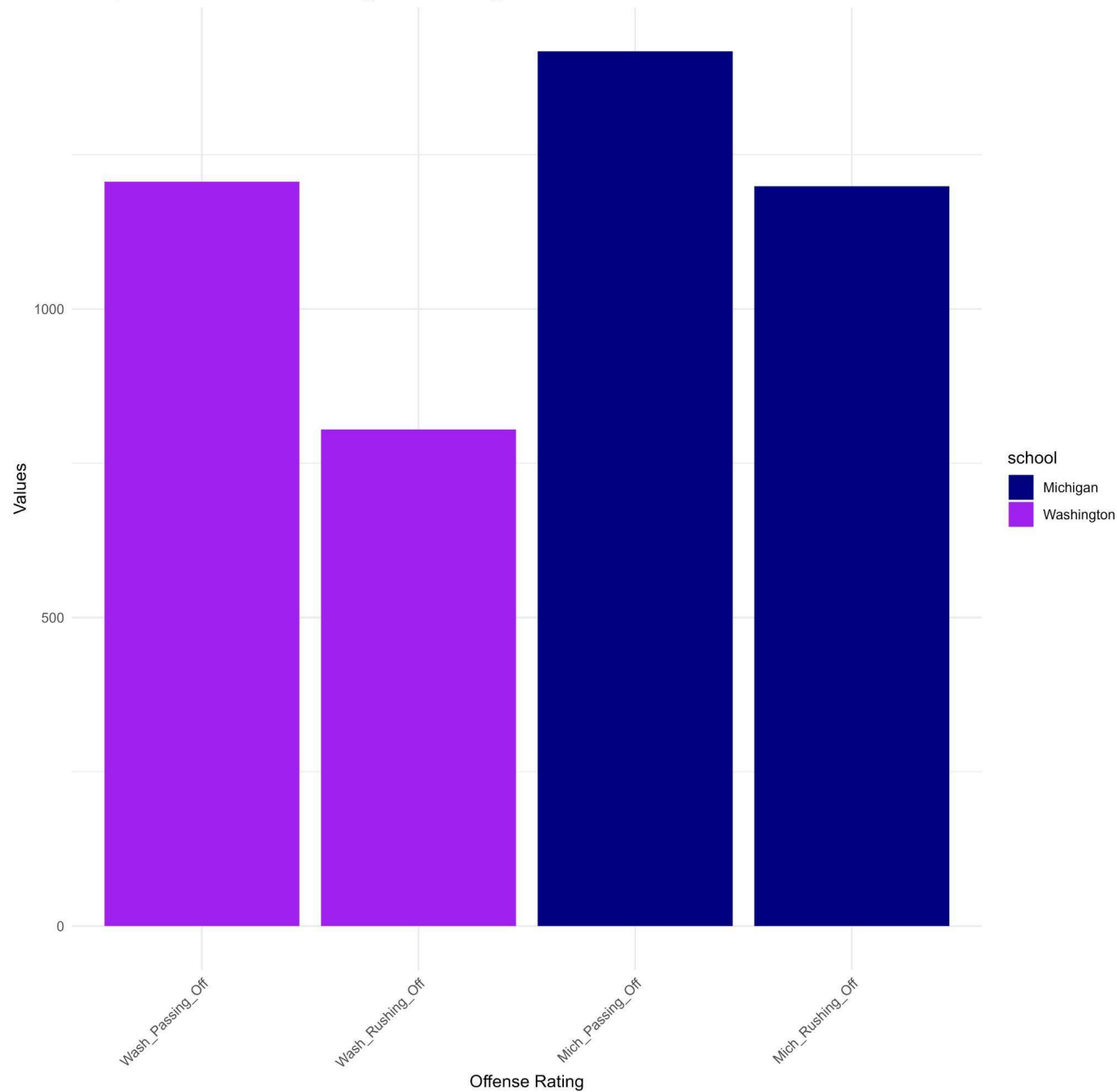
Weighted Rushing Defense

# Appendix G:

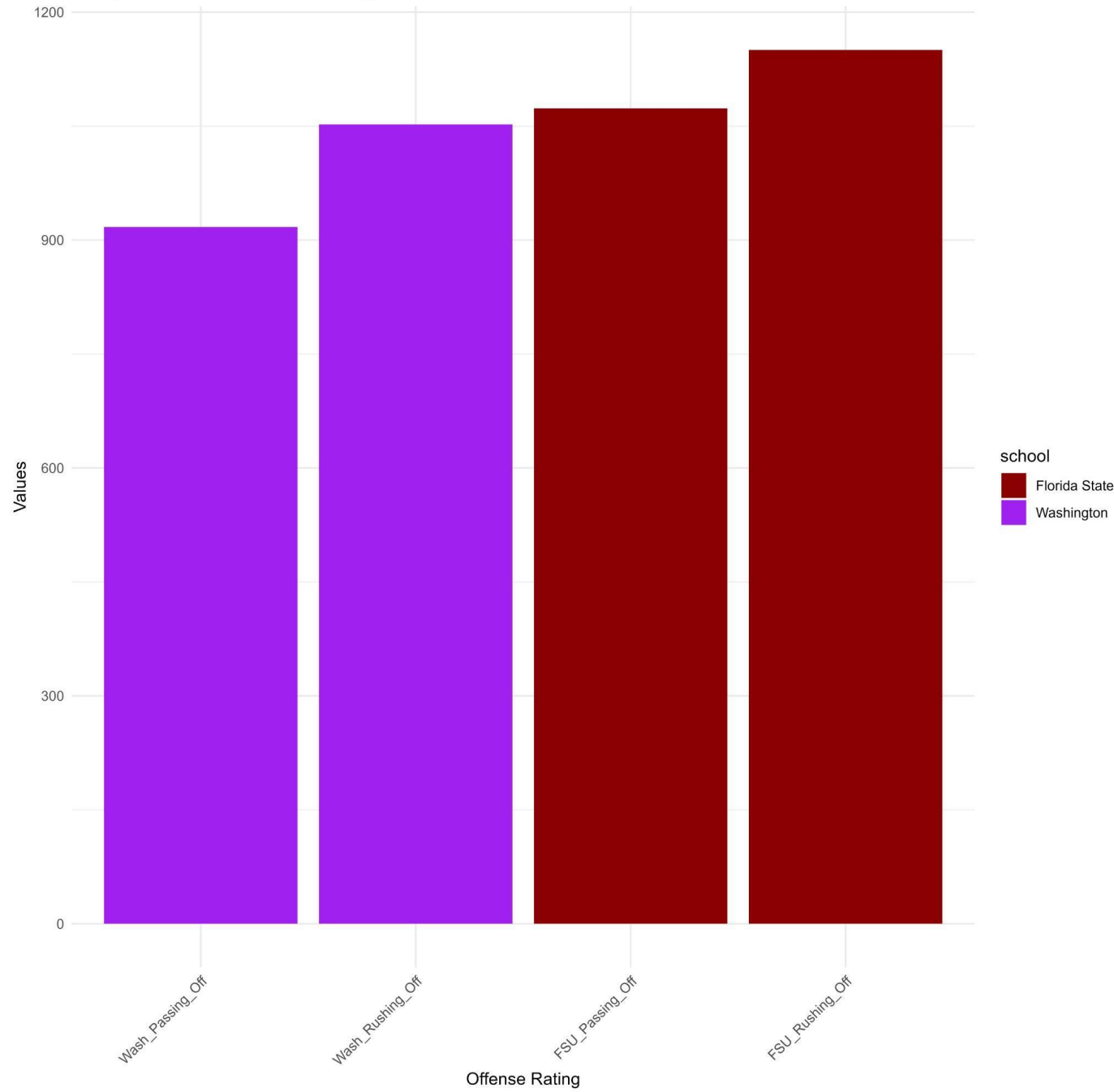Comparison of Offense: Washington vs. Ohio State

# Appendix H:

Comparison of Offense: Washington vs. Michigan

# Appendix I:

Comparison of Offense: Washington vs. Florida State

# Appendix J:

Comparison of Offense: Washington vs. Georgia