

## HOW MUCH IS REGULAR SEASON PASSING YARDAGE RELATED TO SUCCESS IN THE NFL PLAYOFFS?

By Peter B. Wylie, with John Sammis

Yeah, not the kind of stuff John Sammis and I normally write about for Kevin's blog. In fact, you may be saying: "Sorry, guys. Catch ya next time. Sports, especially football, are not my cup of tea." No worries. We understand.

But if you're still reading, here are some reasons we decided to do this project:

**John and I like sports.** Both of us work hard to stay fit, and we enjoy the (mostly) friendly competition that sports allow us. (For John it's running and basketball; for me it's games played with a racket.) John didn't have much time to devote to this particular piece, but he supported my taking a break from our usual fare to delve into professional football.

**There's a lot of heavy duty analysis going on in the world of sports.** Because of the billions of dollars at stake (whether through betting or draft selections or fantasy leagues), this trend is not going to subside.

**Forecasting is in my blood.** I'd like it to be in the blood of the people who are our leaders in fundraising. Sadly, that's not the case for a lot of them. But forecasting is most assuredly in the blood of people involved in professional sports, not to mention college and high school. Show me a day when people in the media aren't vigorously speculating on the outcome of some "key" game. There is no such day.

**Forecasting human behavior is hard.** Forecasting the outcome of sporting events is no exception. Nate Silver and his gang at the FiveThirtyEight blog are a constant reminder of that. About two months before this writing, his team at ESPN put out a piece on their latest and greatest technique for predicting the outcome of NBA games. Very detailed, very sophisticated. I was impressed. What impressed me most was the group's candor when it comes to betting. Basically, they were saying that they beat the point spread about 51% of the time. Bottom line: Don't use their system for betting on NBA games. You'll lose money.

**Much of the data we analyze in the world of fundraising is messy.** That data is often hard to pull together into analyzable form. It's frequently inaccurate. And it can be so confusing that even the folks in charge of storing it can't make sense of it. Sports data that you can pull off the internet is *relatively* clean and neat. Whether you're a beginner or a seasoned analyst, I think you'll find it fun to play around with, if you haven't already done so. I had a ball with it on this project.

**I really was interested in how much regular season passing yardage is related to success in the playoffs.** I'd heard lots of "jawboning" about this relationship. I wanted to see for myself.

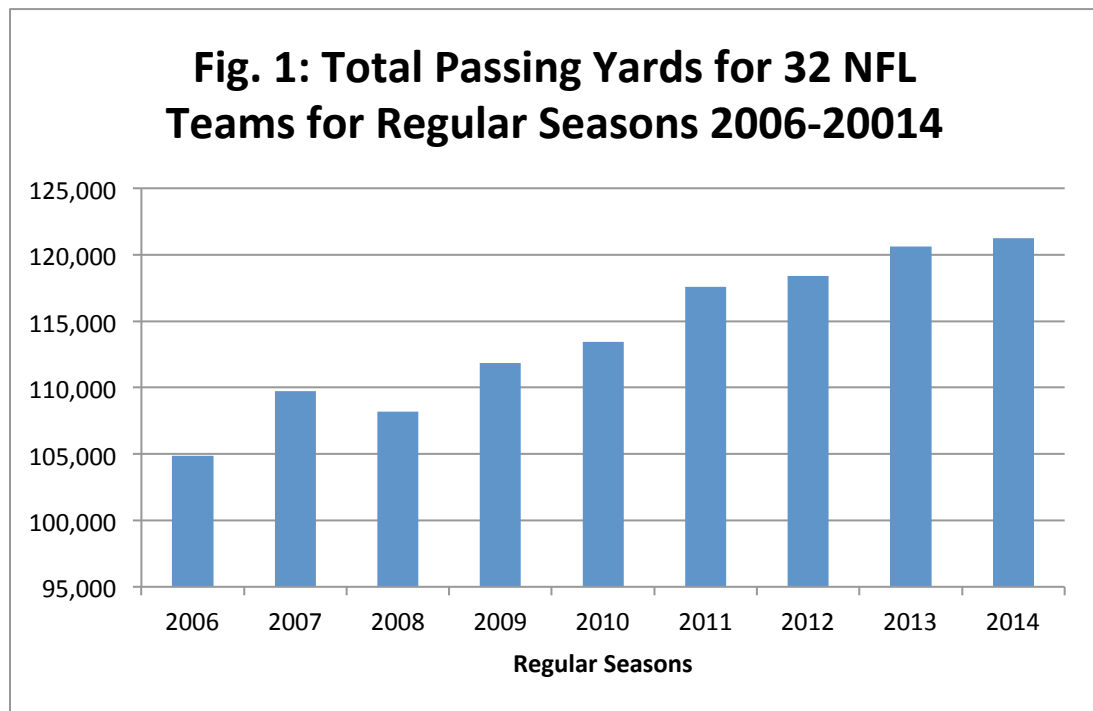
Before we get into the heart of the piece, let's take a look at how the passing game has evolved in the NFL since the regular season of 2006. Take a look at Table 1. It shows how these six passing indexes have changed over the nine year period:

Total passing yards  
 Total passing attempts  
 Completions  
 Total passing touch downs  
 Total interceptions  
 Completion to interception ratio (total completions/total interceptions)

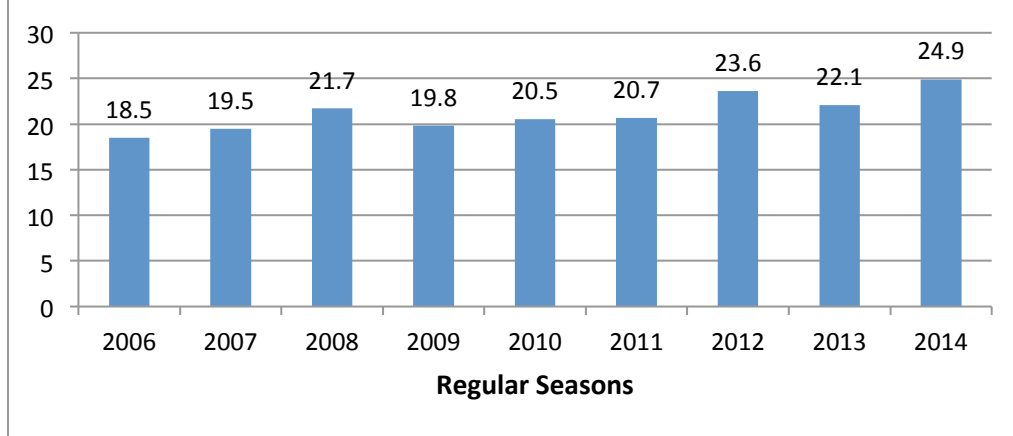
To us, the most interesting indexes are total passing yards and completion to interception ratio. Figures 1 and 2 enhance the trend you can see for both indexes in Table 1.

**Table 1: Six Regular Season Passing Indexes for 32 NFL Teams for Regular Seasons 2006-2014**

REGULAR SEASON	TOTAL PASSING YARDS	TOTAL PASSING ATTEMPTS	COMPLETIONS	TOTAL PASSING TD'S	TOTAL INTERCEPTIONS	COMPLETION TO INTERCEPTION RATIO
2006	104,864	16,389	9,796	648	529	18.5
2007	109,725	17,045	10,425	720	534	19.5
2008	108,177	16,526	10,081	646	465	21.7
2009	111,853	17,034	10,373	710	525	19.8
2010	113,432	17,269	10,491	751	511	20.5
2011	117,601	17,410	10,464	745	506	20.7
2012	118,418	17,788	10,833	757	460	23.6
2013	120,633	18,136	11,102	804	502	22.1
2014	121,247	17,879	11,200	807	450	24.9



**Fig. 2: Completion to Interception  
RATIO for 32 NFL Teams for Regular  
Seasons 2006-2014**



For the last number of years, sportscasters and former pro players and other "experts" have been talking about how changes in the rules have made things both easier and safer for NFL quarterbacks and receivers. Some applaud these changes; others lament them. Applaud or lament, the evidence seems to support these folks. More yards are being gained and fewer interceptions are being made.

On to the thrust of this piece: the relationship (or the lack thereof) between regular season passing yards and success in the playoffs. To determine whether such a relationship exists, we need at least one independent/predictor variable and at least one dependent/outcome variable.

The independent variable is not really a problem here. Take a look at Tables 2 and 3. Both contain a LOT of data. Too much to make sense of by just eyeballing it.

**Table 2: Total Regular Season Passing Yardage for Each of 32 NFL Seasons from 2006-2014**

<b>TEAM</b>	<b>2006 PASSING YARDS</b>	<b>2007 PASSING YARDS</b>	<b>2008 PASSING YARDS</b>	<b>2009 PASSING YARDS</b>	<b>2010 PASSING YARDS</b>	<b>2011 PASSING YARDS</b>	<b>2012 PASSING YARDS</b>	<b>2013 PASSING YARDS</b>	<b>2014 PASSING YARDS</b>
Arizona	3662	4065	4674	4016	2921	3567	3005	4002	3808
Atlanta	2371	3296	3336	3571	3567	4192	4509	4243	4553
Baltimore	3435	3035	2808	3419	3335	3423	3739	3590	3819
Buffalo	2719	2634	3040	2515	3158	3703	3269	3103	3614
Carolina	3264	2735	3158	2799	2289	3829	3683	3043	3511
Chicago	3281	3362	3061	3473	3015	3011	2999	4281	3792
Cincinnati	3833	4012	2406	2890	3767	3340	3578	4136	3421
Cleveland	2898	3726	2380	2076	2989	3090	3435	4047	3465
Dallas	3836	4105	3789	4287	4042	4201	4729	3954	3784
Denver	2799	3584	4471	3627	4038	2434	4534	5444	4661
Detroit	3820	3878	2960	3168	3810	4814	4927	4482	4030
Green Bay	3795	4334	3813	4180	4124	4924	4049	4268	4261
Houston	2778	3751	4267	4654	4144	3506	3830	3813	3352
Indianapolis	4308	4033	4094	4515	4609	2995	4128	3725	4894
Jacksonville	2882	3328	3332	3356	3065	2179	3419	3441	3001
Kansas City	3000	3181	3129	2922	2968	3080	2713	3340	3182
Miami	3287	3031	3632	3170	3527	3091	3182	3567	3729
Minnesota	3123	2745	2956	4156	3097	2957	2751	3427	3244
New England	3400	4731	3569	4436	3847	5084	4662	4087	4121
New Orleans	4503	4314	4977	4355	4441	5347	4997	4918	4764
NY Giants	3058	3154	3177	4019	3885	4734	3825	3588	4272
NY Jets	3153	3014	3303	2380	3242	3297	2891	2932	2946
Oakland	2420	2631	2369	2557	3180	3962	4084	3340	3275
Philadelphia	4119	3755	3911	4089	3906	4110	3791	4110	4356
Pittsburgh	3733	3071	3301	4148	3601	4054	3787	4017	4825
San Diego	3262	3005	3858	4338	4519	4426	3295	4328	4098
San Francisco	2688	2320	3379	3052	3356	2930	3298	2979	3063
Seattle	3054	3964	2617	3503	3341	3105	3031	3236	3250
St. Louis	3962	3233	2947	2686	3268	2870	3550	3125	3400
Tampa Bay	2798	3357	3619	2975	3361	3650	3983	2820	3297
Tennessee	2596	2878	2819	3031	3107	3923	3323	3496	3412
Washington	3027	3463	3025	3490	3913	3773	3422	3751	4047

**Table 3: Total Regular Season Passing Yardage Ranks for Each of 32 NFL Seasons from 2006-2014**

TEAM	Rank:2006 PASSING YARDS	Rank:2007 PASSING YARDS	Rank:2008 PASSING YARDS	Rank:2009 PASSING YARDS	Rank:2010 PASSING YARDS	Rank:2011 PASSING YARDS	Rank:2012 PASSING YARDS	Rank:2013 PASSING YARDS	Rank:2014 PASSING YARDS
Arizona	23	28	31	21	2	16	5	20	19
Atlanta	1	15	19	19	18	25	27	26	28
Baltimore	22	10	5	15	13	14	18	15	20
Buffalo	5	3	11	3	9	18	8	5	15
Carolina	18	4	14	6	1	20	17	4	14
Chicago	19	18	12	16	5	7	4	28	18
Cincinnati	27	26	3	7	20	13	16	25	12
Cleveland	10	21	2	1	4	9	14	22	13
Dallas	28	29	24	27	27	26	30	19	17
Denver	8	20	30	20	26	2	28	32	29
Detroit	26	24	9	12	21	29	31	30	21
Green Bay	25	31	25	26	28	30	24	27	25
Houston	6	22	29	32	29	15	22	18	9
Indianapolis	31	27	28	31	32	6	26	16	32
Jacksonville	9	16	18	14	6	1	12	11	2
Kansas City	11	13	13	8	3	8	1	8.5	4
Miami	20	9	23	13	17	10	7	13	16
Minnesota	15	5	8	25	7	5	2	10	5
New England	21	32	21	30	22	31	29	23	24
New Orleans	32	30	32	29	30	32	32	31	30
NY Giants	14	12	15	22	23	28	21	14	26
NY Jets	16	8	17	2	11	12	3	2	1
Oakland	2	2	1	4	10	22	25	8.5	7
Philadelphia	30	23	27	23	24	24	20	24	27
Pittsburgh	24	11	16	24	19	23	19	21	31
San Diego	17	7	26	28	31	27	9	29	23
San Francisco	4	1	20	11	15	4	10	3	3
Seattle	13	25	4	18	14	11	6	7	6
St. Louis	29	14	7	5	12	3	15	6	10
Tampa Bay	7	17	22	9	16	17	23	1	8
Tennessee	3	6	6	10	8	21	11	12	11
Washington	12	19	10	17	25	19	13	17	22

Table 1 shows the total regular season passing yards gained by each of the 32 NFL teams over the nine year period. Table 3 shows the yearly regular season rank for passing yardage for the same nine year period. Just to be clear, a rank of 32 refers to the team that had the *most* passing yardage in a given year; a rank of 1 refers to the team that had the *least* passing yardage in a given year. For example, in Table 2 for

the 2006 regular season we see that New Orleans had 4503 total passing yards; in Table 3 New Orleans had a rank of 32. That 4503 is the *most* total passing yardage of all the 32 teams in the league for that year. Conversely, in Table 2 for the same regular season we see that Atlanta had 2371 total passing yards; in Table 3 Atlanta had a rank of 1. That 2371 is the *least* total passing yardage of all the 32 teams in the league for that year.

But what about a dependent variable or set of dependent variables that get at success in the playoffs? That's a bit tricky. The most obvious variable, of course, is winning the Super Bowl. Can we show a relationship between a team's regular season passing yardage and whether or not it won the big game with the lousy halftime extravaganza? Or how about whether or not a team won the conference finals? Or whether or not it won the division title? Or whether or not it made it into the playoffs at all, even if only as a wild card?

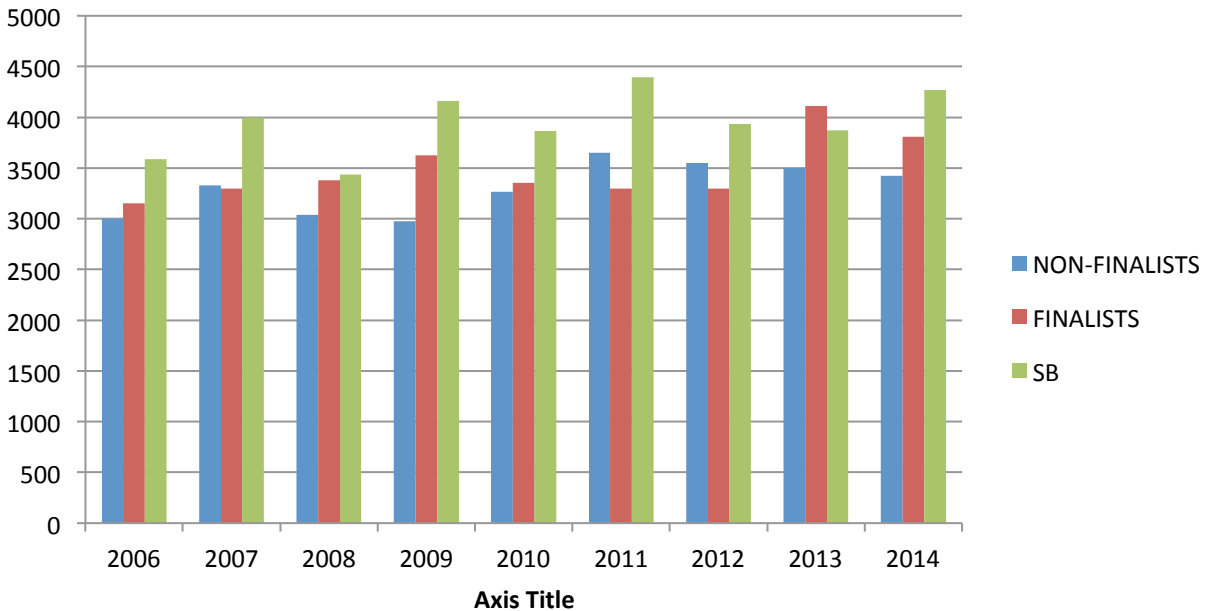
A lot of options. Ultimately, we decided to turn things upside down and use these three groups as the independent variable:

- **The eight teams who won at least one Super Bowl** (Baltimore, Green Bay, Indianapolis, New England, New York Giants, New Orleans, Pittsburgh, and Seattle)
- **The nine teams who made it to at least one conference final** (Atlanta, Arizona, Chicago, Denver, Minnesota, New York Jets, Philadelphia, San Diego, and San Francisco)
- **The fifteen teams who never made it to a conference final** (Buffalo, Carolina, Cincinnati, Cleveland, Dallas, Detroit, Houston, Jacksonville, Kansas City, Miami, Oakland, St. Louis, Tampa Bay, Tennessee, and Washington)

So then our “research” question got more specific: Was there a distinct difference over the nine regular seasons among Super Bowl winners, Conference Finalists, and Conference Non-Finalists with respect to regular season total passing yardage? Let's see.

Figure 4 shows the difference in median regular season passing yardage among these three groups over the nine seasons. Take a look. Then we'll tell you what we see.

**Fig. 3: Median Passing Yards across Nine Regular Seasons for 8 Superbowl Winners, 9 Conference Finalists, and 15 Non-Finalists**



There are two facts that support the idea that passing yardage is related to post season performance:

- Except for regular season 2013, the Super Bowl Winners had the highest median passing yardage.
- The Super Bowl Winners *always* had a higher median passing than the Conference Non-Finalists.

However, two facts support the idea that passing yardage is no *guarantee* of post season performance:

- In three out of the nine seasons the median passing yardage for the Conference Non-Finalists was higher than the median for the Finalists (2007, 2011, and 2012).
- In two other seasons (2006 and 2010) the difference between the median passing yardage for the Finalists and the Non-Finalists was very small.

The second thing we looked at was the regular season passing yardage *rankings* of the three groups across the nine years period. If regular season passing yardage is positively related to postseason success, then: The Super Bowl Winners should have higher rankings than the Conference Finalists, and the Conference Finalists should have higher rankings than the Conference Non-Finalists.

That idea seems simple enough, but the rub was finding a way to clearly convey what we found. See if Tables 4-6 do the trick for you. If not, we've got some graphics that may be more to your liking. We'll go through the tables in some detail to help make sure they're clear.

Table 4 shows the frequency and percentage distribution for the 15 Non-Finalists rankings across the nine regular seasons that fell into eight rank groups. Since there are 15 teams and nine regular seasons, there are a total of 135 ranking to look at. Twenty-one of those ranks ranged from 1-4. Twenty-one divided by 135 makes for a percentage of 15.6. Now let's look at the percentage of rankings that fell between 1 and 16. It's 63%.

**Table 4: Percentage Distribution of Regular Season Total Passing Rankings for 15 Teams That Never Made the Conference Playoffs**

Rank Groups	Count	%	Cumulative %
1-4	21	15.6	15.6
5-8	21	15.6	31.1
9-12	24	17.8	48.9
13-16	19	14.1	63.0
17-20	17	12.6	75.6
21-24	14	10.4	85.9
25-28	10	7.4	93.3
29-32	9	6.7	100.0

Table 5 shows the frequency and percentage distribution for the nine Finalists rankings across the nine regular seasons that fell into eight rank groups. Since there are nine teams and nine regular seasons, there are a total of 81 rankings to look at. Fourteen of those rankings ranged from 1-4 for a percentage of 17.3. The percentage of rankings that fell between 1 and 16 is 46.9%.

**Table 5: Percentage Distribution of Regular Season Total Passing Rankings for 9 Teams That Made the Conference Playoffs but Did Not Make the Super Bowl**

Rank Groups	Count	%	Cumulative %
1-4	14	17.3	17.3
5-8	11	13.6	30.9
9-12	7	8.6	39.5
13-16	6	7.4	46.9
17-20	14	17.3	64.2
21-24	8	9.9	74.1
25-28	14	17.3	91.4
29-32	7	8.6	100.0

Table 6 shows the frequency and percentage distribution for the eight Super Bowl Winner rankings across the nine regular seasons that fell into eight rank groups. Since there are eight teams and nine regular seasons, there are a total of 72 rankings to look at. Only one of those rankings fell into the 1-4 category for a percentage of 1.4. The percentage of rankings that fell between 1 and 16 is 29.2%.



**Table 6: Percentage Distribution of Regular Season Total Passing Rankings for 8 Teams That Made the Super Bowl**

Rank Groups	Count	%	Cumulative %
1-4	1	1.4	1.4
5-8	5	6.9	8.3
9-12	4	5.6	13.9
13-16	11	15.3	29.2
17-20	5	6.9	36.1
21-24	14	19.4	55.6
25-28	12	16.7	72.2
29-32	20	27.8	100.0

So ... did the Super Bowl Winners have higher rankings than the Conference Finalists, and the Conference Finalists have higher rankings than the Conference Non-Finalists? We think the answer is a definitive yes. To confirm that, you can do a little arithmetic and see that:

- Almost 45% of the Super Bowl Winners had ranking of 25 or greater.
- About 25% of the Finalists had rankings of 25 or greater.
- About 15% of the Non-Finalists had rankings of 25 or greater.

### **Closing Thoughts from a Longtime Analyst**

When John looked at the original version of this section, he politely indicated that some of my remarks in this section might have been too pointed. He's probably right. Anyway, I've limited my thoughts to two:

**There are lots of tables and charts here for results that seem ... you know ... sort of commonsensical.**

As I finished off this piece, I kept saying just that. "So you've shown there's a moderate relationship between regular season passing yardage and postseason performance. What's so earthshaking about that?"

Then I thought, Wait a minute. I spent hours and hours amassing data before I did any analysis at all. Then I spent even more hours looking to see what that relationship might be. And finally, I spent all kinds of time figuring out how to make all this stuff clear. Shouldn't I get some credit for that?

Forget about me. *Any* analyst who (1) spends a lot of time pulling together a bunch of data, (2) forages through that data to find something meaningful, and (3) writes up what they did – that person deserves a lot of credit. So if you do something like that and a colleague (or worse) a boss dismisses your effort as not particularly useful, that colleague or boss deserves a swift kick in the pants. Whether or not you deliver the kick, of course, depends on circumstances I can't possibly know about. But make no mistake, the person richly deserves the kick.

**Variables that measure human behavior often have disappointing correlations with one another.**

I came up close and personal with this fact when I went to grad school in the late 60's in New York City. I was pursuing an advanced degree with an emphasis on statistics and measurement in the behavioral sciences. Most of my teachers were older. Many of them had worked on building tests during World War II that were used for selecting candidates for critical jobs like fighter pilots. These old boys (no gals) were consummate applied scientists. They made no bones about the fact that predicting success in these programs was grueling and disappointing. "The error variance in our tests always outweighed the predicted variance. Always." That's what they said.

Have things changed a lot since then? I don't think so. Look at the SAT. Probably no single measure of human capacity has had more research done on it. And how well does that measure predict college performance for the millions of kids that take it every year? Sort of okay? Yeah? Not much better than it did 50 years ago.

And what's the takeaway of that cold, hard truth? One takeaway is being skeptical of any vendor who makes claims of the power of their products and services to identify generous future donors. Look for the ones who make cautious claims peppered with caveats. Look for the ones who talk with a tone of humility.

**APPENDIX**

The next two tables are for football enthusiasts who might find them interesting. Or not.

**Table 7: Results of Each AFC and NFC Conference Final as Well as Super Bowl Winners for Regular Seasons 2006-2014**

Regular Season	AFC Conference Finals	NFC Conference Finals	SUPER BOWL WINNERS
2014	NE beat Indianapolis 45-7	Seattle beat Green Bay 28-22	New England
2013	Denver beat NE 32-23	Seattle beat San Francisco 23-17	Seattle
2012	Baltimore beat NE 28-13	San Francisco beat Atlanta 28-24	Baltimore
2011	NE beat Baltimore 23-20	NY Giants beat San Francisco 20-17	New York Giants
2010	Pittsburgh beat NY Jets 24-19	Green Bay beat Chicago 21-14	Green Bay
2009	Indianapolis beat NY Jets 30-17	New Orleans beat Minnesota 31-28	New Orleans
2008	Pittsburgh beat Baltimore 23-14	Arizona beat Philadelphia 32-25	Pittsburgh
2007	NE beat San Diego 21-12	NY Giants beat Green Bay 23-20	New York Giants
2006	Indianapolis beat NE 38-34	Chicago beat New Orleans 39-14	Indianapolis

**Table 8: Regular Season Passing Ranks Each Team in AFC and NFC Conference Finals for Regular Seasons 2006-2014**

Regular Season	AFC Conference Finals	NFC Conference Finals
2014	NE(24) beat Indianapolis(32)	Seattle(6) beat Green Bay(25)
2013	Denver(32) beat NE(23)	Seattle(7) beat San Francisco(3)
2012	Baltimore(18) beat NE(29)	San Francisco(10) beat Atlanta(27)
2011	NE(31) beat Baltimore(14)	NY Giants(28) beat San Francisco(4)
2010	Pittsburgh(19) beat NY Jets(11)	Green Bay(28) beat Chicago(5)
2009	Indianapolis(31) beat NY Jets(2)	New Orleans(29) beat Minnesota(25)
2008	Pittsburgh(16) beat Baltimore(5)	Arizona(31) beat Philadelphia(27)
2007	NE(32) beat San Diego(7)	NY Giants(12) beat Green Bay(31)
2006	Indianapolis(31) beat NE(21)	Chicago(19) beat New Orleans(32)

One other thing. Statistical tests. We left them out of the piece for three reasons:

- In the behavioral sciences there's an ongoing debate as to whether statistical tests should even be reported in professional journals. (If you're interested, do a quick web search and be prepared to wade through some pretty bad writing.)
- The tests we would have to use to show our results are **NOT** a function of chance are complicated and confusing.
- We think our tables and charts do a good job of speaking for themselves. ***On the other hand***, if you want to argue with us about the tests, email us or call us. We certainly owe you that because we don't ever want to come off as arrogant or dismissive (which Peter can be from time to time).