

The Most Productive Offensive Players in 2024

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Former SABR member Bill Gilbert developed a method for measuring offensive performance, Bases per Plate Appearance (BPA), that he updated after every season. To honor him and to continue his work, I have performed the calculations for 2024 using Retrosheet data for the seasons 1912 to 2024.

I have modified the formula Bill developed originally, adding in the effects of triple plays. The formula is

$$\text{BPA} = (\text{TB} + \text{BB} + \text{HBP} + \text{SB} - \text{CS} - \text{PO} - \text{DP} - 2 \times \text{TP}) / (\text{AB} + \text{BB} + \text{HBP} + \text{SF})$$

Where:

BPA = Bases per Plate Appearance
TB = Total Bases
BB = Bases on Balls
HBP = Hit by Pitch
SB = Stolen Bases
CS = Caught Stealing

PO = Picked Off
DP = Double Plays
TP = Triple Plays
AB = At Bats
SF = Sacrifice Flies

The numerator accounts for all the bases accumulated by a player, reduced by the number of times he is caught stealing, picked off, or erases other runners by hitting into a double or triple play. The denominator accounts for the plate appearances when the player is trying to generate bases for himself. Sacrifice hits are not included as plate appearances since they represent the successful execution of the batter's attempts to advance another runner.

The table below shows the Major League BPA for the past fifteen years and the number of players with both a BPA over .550 and enough plate appearances to qualify for the batting title:

| Year | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|--------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| BPA | .439 | .435 | .440 | .430 | .420 | .434 | .450 | .460 | .446 | .470 | .461 | .451 | .434 | .459 | .444 |
| >=.550 | 17 | 21 | 15 | 14 | 8 | 17 | 21 | 31 | 19 | 39 | 32 | 26 | 13 | 17 | 15 |
| >=.600 | 7 | 6 | 3 | 3 | 3 | 5 | 6 | 10 | 6 | 13 | 18 | 7 | 3 | 7 | 6 |
| >=.650 | 1 | 1 | 1 | 2 | 0 | 1 | 1 | 3 | 2 | 3 | 5 | 3 | 1 | 2 | 2 |
| >=.700 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 1 | 0 | 1 | 1 | 2 |
| >=.750 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |

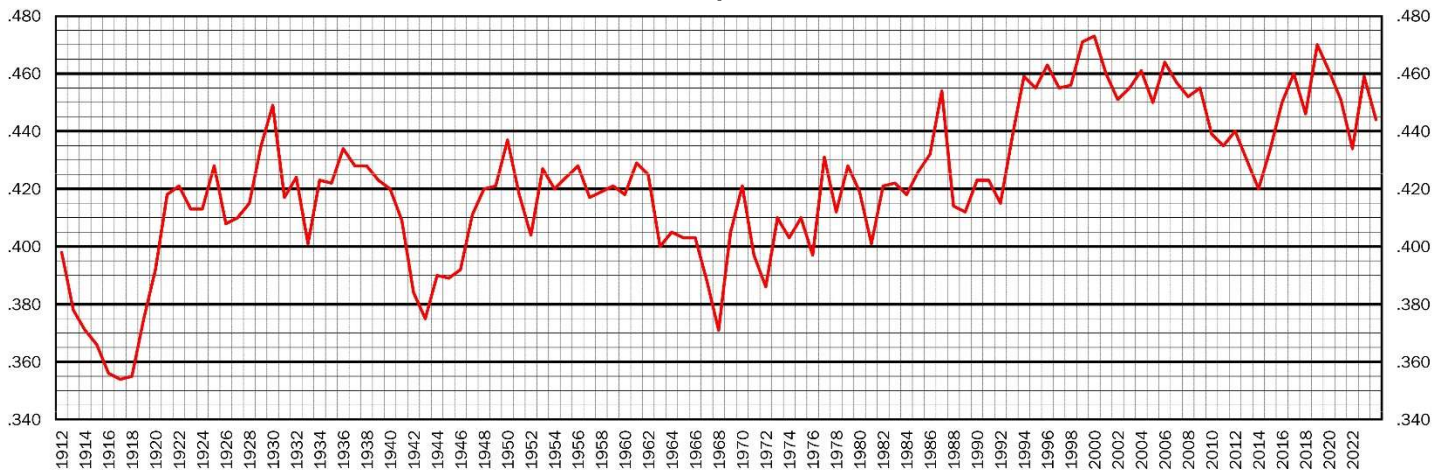
The graph of total BPA per season reflects the impacts of both history and changing playing rules on run production. The graph starts in the dead ball era as BPA show an historic low in 1916. The 1917-1919 seasons were also impacted by World War I. After the war and with the introduction of the lively baseball, BPA increased dramatically, exceeding .400 for the first time in 1921. The peak of the post-WWI era occurred in 1930, a result that would not be bettered until 1987.

Season BPA stayed above .400 until the start of World War II. During this war (1942-1946), season BPA remained below .400. With the end of the war, the BPA recovered and stayed constant until 1962. The rise of pitching domination is reflected in the drop in BPA from 1962 until the introduction of the lowered pitching mound in 1969 and the designated hitter in 1973. The BPA in 1968 was the lowest since the dead-ball year of 1918.

Season BPA steadily increased with the DH and exploded to new highs during the steroid era, recording the highest BPA ever in 2000 at .473.

The post-steroid, 2010 to 2014, shows a resurgence of pitching over hitting, with the lowest BPA in 2014 triggering what many consider changes to the composition of the ball to increase offensive production. The most recent dip and recovery in BPA may be attributed to rule changes to eliminate certain defensive alignments and increase the pace of play.

Total BPA per Season



To compare a player's performance across different seasons, I developed a percentage calculation called the Relative BPA (rBPA). A player achieves a score of 100 if he matches the overall BPA for a particular season. An above-average performance would result in an rBPA of greater than 100. Conversely, an rBPA below 100 represents a below-average season.

| Highest BPA - 1912 to 2024 | | |
|----------------------------|--------|------|
| Player | Season | BPA |
| Bonds, Barry | 2001 | .901 |
| Bonds, Barry | 2004 | .875 |
| Bonds, Barry | 2002 | .864 |
| Ruth, Babe | 1921 | .863 |
| Ruth, Babe | 1920 | .846 |
| Bonds, Barry | 2003 | .815 |
| Ruth, Babe | 1923 | .798 |
| McGwire, Mark | 1998 | .793 |
| Ruth, Babe | 1927 | .792 |

| Highest rBPA - 1912 to 2024 | | |
|-----------------------------|--------|-------|
| Player | Season | rBPA |
| Ruth, Babe | 1920 | 215.8 |
| Ruth, Babe | 1921 | 206.5 |
| Bonds, Barry | 2001 | 195.9 |
| Ruth, Babe | 1923 | 193.2 |
| Ruth, Babe | 1927 | 193.2 |
| Bonds, Barry | 2002 | 191.6 |
| Bonds, Barry | 2004 | 189.8 |
| Ruth, Babe | 1924 | 188.6 |
| Gehrig, Lou | 1927 | 186.6 |

| Highest BPA - 1912 to 2024 | | |
|----------------------------|--------|------|
| Player | Season | BPA |
| Ruth, Babe | 1924 | .779 |
| Soto, Juan | 2020 | .776 |
| Bagwell, Jeff | 1994 | .766 |
| Gehrig, Lou | 1927 | .765 |
| McGwire, Mark | 1996 | .765 |
| Foxx, Jimmie | 1932 | .762 |
| Mantle, Mickey | 1956 | .759 |
| Williams, Ted | 1957 | .758 |
| Ruth, Babe | 1931 | .756 |

| Highest rBPA - 1912 to 2024 | | |
|-----------------------------|--------|-------|
| Player | Season | rBPA |
| Ruth, Babe | 1926 | 184.3 |
| Ruth, Babe | 1919 | 183.7 |
| Williams, Ted | 1941 | 182.4 |
| Williams, Ted | 1957 | 181.8 |
| Williams, Ted | 1946 | 181.6 |
| Ruth, Babe | 1931 | 181.3 |
| Williams, Ted | 1942 | 180.5 |
| Morgan, Joe L. | 1976 | 180.4 |
| Foxx, Jimmie | 1932 | 179.7 |

The benchmark for an outstanding individual season is .600. Six players with enough plate appearances to qualify for the batting title achieved this mark in 2024.

| Player | Team | BPA | rBPA |
|-----------------|-----------|------|-------|
| Ohtani, Shohei | Dodgers | .746 | 168.0 |
| Judge, Aaron | Yankees | .740 | 166.7 |
| Soto, Juan | Yankees | .633 | 142.6 |
| Witt Jr, Bobby | Royals | .628 | 141.4 |
| Rooker, Brent | Athletics | .609 | 137.2 |
| Alvarez, Yordan | Astros | .603 | 135.8 |

Looking at the other end of the spectrum, these players who earned enough playing time to qualify for the batting title had a BPA less than .400 in 2024.

| Player | Team | BPA | rBPA |
|--------------------|-----------------|------|------|
| Arcia, Orlando | Braves | .373 | 84.0 |
| Verdugo, Alex | Yankees | .378 | 85.1 |
| France, Ty | Mariners/Reds | .385 | 86.7 |
| Frelick, Sal | Brewers | .391 | 88.1 |
| Morel, Christopher | Cubs/Rays | .391 | 88.1 |
| Gimenez, Andres | Guardians | .392 | 88.3 |
| Young, Jacob | Nationals | .393 | 88.5 |
| Meyers, Jake | Astros | .396 | 89.2 |
| De La Cruz, Bryan | Marlins/Pirates | .399 | 89.9 |

In 2024, six Houston Astros qualified with enough plate appearances. One broke the .600 barrier. None of the qualifying Astros improved his BPA in 2024.

| Player | 2024 | | 2023 | |
|-----------------|------|-------|-------|--------|
| | BPA | rBPA | BPA | rBPA |
| Alvarez, Yordan | .603 | 135.8 | .631* | 137.5* |
| Altuve, Jose | .479 | 107.9 | .578* | 125.9* |
| Bregman, Alex | .470 | 105.9 | .488 | 106.3 |
| Diaz, Yainer | .425 | 95.7 | .509* | 110.9* |
| Pena, Jeremy | .417 | 93.9 | .417 | 90.8 |
| Meyers, Jake | .396 | 89.2 | .434* | 94.6* |

* Not enough Plate Appearances to qualify.

Two Astros had more than 400 plate appearances but did not have enough to qualify. Jon Singleton improved his BPA in 2024.

| Player | 2024 | | 2023 | |
|----------------|------|-------|------|------|
| | BPA | rBPA | BPA | rBPA |
| Dubón, Maricio | .369 | 83.1 | .421 | 91.7 |
| Singleton, Jon | .447 | 100.7 | .333 | 72.5 |

BPA Yearly Leaders – 1912 to 2024

| Season | Batter | BPA | Season | Batter | BPA | Season | Batter | BPA |
|--------|---------------------------|------|--------|-----------------------------|------|--------|------------------------------|------|
| 1912 |Speaker, Tris..... | .625 | 1950 | Musial, Stan..... | .635 | 1988 | Canseco, José..... | .619 |
| 1913 |Leach, Tommy..... | .516 | 1951 | Kiner, Ralph..... | .694 | 1989 | Mitchell, Kevin..... | .656 |
| 1914 |Kauff, Benny..... | .610 | 1952 | Doby, Larry..... | .596 | 1990 | Henderson, Rickey..... | .699 |
| 1915 |Cobb, Ty.. | .616 | 1953 | Snider, Duke..... | .668 | 1991 | Tartabull, Danny..... | .621 |
| 1916 |Cobb, Ty.. | .571 | 1954 | Williams, Ted..... | .698 | 1992 | Bonds, Barry..... | .722 |
| 1917 |Cobb, Ty.. | .608 | 1955 | May, Willie..... | .692 | 1993 | Bonds, Barry..... | .733 |
| 1918 |Cobb, Ty.. | .526 | 1956 | Mantle, Mickey..... | .759 | 1994 | Bagwell, Jeff..... | .766 |
| 1919 |Ruth, Babe..... | .689 | 1957 | Williams, Ted..... | .758 | 1995 | Belle, Albert..... | .685 |
| 1920 |Ruth, Babe..... | .846 | 1958 | Mantle, Mickey..... | .672 | 1996 | McGwire, Mark..... | .765 |
| 1921 |Ruth, Babe..... | .863 | 1959 | Aaron, Hank..... | .638 | 1997 | Walker, Larry..... | .755 |
| 1922 |Hornsby, Rogers..... | .722 | 1960 | Mantle, Mickey..... | .624 | 1998 | McGwire, Mark..... | .793 |
| 1923 |Ruth, Babe..... | .798 | 1961 | Mantle, Mickey..... | .752 | 1999 | McGwire, Mark..... | .728 |
| 1924 |Ruth, Babe..... | .779 | 1962 | Mantle, Mickey..... | .707 | 2000 | Bonds, Barry..... | .735 |
| 1925 |Hornsby, Rogers..... | .718 | 1963 | Aaron, Hank..... | .634 | 2001 | Bonds, Barry..... | .901 |
| 1926 |Ruth, Babe..... | .752 | 1964 | Mantle, Mickey..... | .646 | 2002 | Bonds, Barry..... | .864 |
| 1927 |Ruth, Babe..... | .792 | 1965 | Mays, Willie..... | .665 | 2003 | Bonds, Barry..... | .815 |
| 1928 |Ruth, Babe..... | .734 | 1966 | Allen, Dick..... | .656 | 2004 | Bonds, Barry..... | .875 |
| 1929 |Ruth, Babe..... | .704 | 1967 | Yastrzemski, Carl..... | .655 | 2005 | Lee, Derrek..... | .695 |
| 1930 |Ruth, Babe..... | .737 | 1968 | McCovey, Willie..... | .576 | 2006 | Hafner, Travis..... | .698 |
| 1931 |Ruth, Babe..... | .759 | 1969 | McCovey, Willie..... | .692 | 2007 | Rodriguez, Álex..... | .696 |
| 1932 |Foxx, Jimmie..... | .762 | 1970 | McCovey, Willie..... | .669 | 2008 | Pujols, Albert..... | .674 |
| 1933 |Foxx, Jimmie..... | .719 | 1971 | Aaron, Hank..... | .682 | 2009 | Pujols, Albert..... | .693 |
| 1934 |Gehrig, Lou..... | .729 | 1972 | Allen, Dick..... | .652 | 2010 | Bautista, José A..... | .665 |
| 1935 |Foxx, Jimmie..... | .675 | 1973 | Stargell, Willie..... | .673 | 2011 | Bautista, José A..... | .673 |
| 1936 |Gehrig, Lou..... | .733 | 1974 | Morgan, Joe L..... | .634 | 2012 | Trout, Mike..... | .653 |
| 1937 |Gehrig, Lou..... | .689 | 1975 | Morgan, Joe L..... | .678 | 2013 | Davis, Chris..... | .666 |
| 1938 |Foxx, Jimmie..... | .739 | 1976 | Morgan, Joe L..... | .716 | 2014 | Trout, Mike..... | .618 |
| 1939 |Foxx, Jimmie..... | .704 | 1977 | Smith, Reggie..... | .631 | 2015 | Harper, Bryce..... | .688 |
| 1940 |Mize, Johnny..... | .672 | 1978 | Parker, Dave..... | .612 | 2016 | Trout, Mike..... | .651 |
| 1941 |Williams, Ted..... | .746 | 1979 | Lynn, Fred..... | .653 | 2017 | Trout, Mike..... | .714 |
| 1942 |Williams, Ted..... | .693 | 1980 | Brett, George..... | .683 | 2018 | Trout, Mike..... | .733 |
| 1943 |Musial, Stan..... | .574 | 1981 | Schmidt, Mike..... | .698 | 2019 | Yelich, Christian..... | .751 |
| 1944 |Nicholson, Bill..... | .646 | 1982 | Schmidt, Mike..... | .610 | 2020 | Soto, Juan..... | .776 |
| 1945 |Holmes, Tommy..... | .627 | 1983 | Henderson, Rickey..... | .622 | 2021 | Tatis Jr, Fernando..... | .676 |
| 1946 |Williams, Ted..... | .712 | 1984 | Henderson, Rickey..... | .597 | 2022 | Judge, Aaron..... | .730 |
| 1947 |Kiner, Ralph..... | .661 | 1985 | Henderson, Rickey..... | .656 | 2023 | Ohtani, Shohei..... | .709 |
| 1948 |Musial, Stan..... | .739 | 1986 | Raines Sr, Tim..... | .609 | 2024 | Ohtani, Shohei..... | .746 |
| 1949 |Kiner, Ralph..... | .698 | 1987 | Davis, Eric..... | .698 | | | |