**Recreational Discards in Numbers and Pounds for Selected Stocks in the**

**U.S. Gulf of Mexico**

**INTRODUCTION**

In May 2019, the Gulf of Mexico Fisheries Management Council (Council) requested a dataset including discards in numbers and weight for the private recreational, charter vessel, headboat, and commercial fleets by gear type, and year for the following species:

* Red snapper
* Vermilion snapper
* Red grouper
* Gag
* Greater amberjack
* Gray triggerfish
* King mackerel
* Spanish mackerel
* Cobia

Due to staffing limitations and conflicting commitments it was not possible to complete all of the work described above. However, in subsequent meetings with Council staff, the Science Center was able to negotiate a reduced task list. The Center agreed to give precedence to providing ***recreational*** discards in numbers and pounds for priority species, including: Red snapper, Gag grouper and Greater amberjack. Commercial discards for selected species (i.e. red snapper, red grouper) were provided in separate documents. The Council also requested a brief description of the methods, assumptions, and limitations associated with the use of these estimates.

**METHODS**

To the extent possible, the estimates provided here are consistent with decisions made for the most recent assessment of a given stock. For most species, two approaches were applied to estimate recreational discards.

* The first method used the most recent (May 2019) extraction of MRIP recreational discards in numbers (unless otherwise noted), and used stock assessment derived average weight to compute discards in weight.
* The second method used the assessment predictions of discards in numbers and weight.

The principal assumptions and limitations of each approach are noted in the results section for that species.

**RESULTS**

**Red Snapper**

Given the time available, it was not possible to break out red snapper recreational discards into the same strata used in the most recent stock assessment model, therefore, only Approach #2 (described above) is presented. This analysis was conducted earlier this year, and was made available to Congressional Staff (HNR) in February 2019.

The specific approach used to estimate the number of total discards differs from fleet to fleet; however, generally speaking the process involves using observed data to calculate a rate of discard (number of fish discarded per unit fishing effort) and then multiplying that rate by an estimate of total effort to obtain an estimate of total discards (Discards (numbers) on **Table 2-3**). For a variety of reasons, weights of discarded fish are not often measured. Consequently, estimates of discard weight, like the ones provided here, must be derived using additional sources of information.

The weight of discarded red snapper (Discards (lbs.) on **Table 2-3**) were calculated by multiplying discards (numbers) by a year and fleet-specific estimate of average weight per discard obtained from the most recent stock assessment model. Dead discards, in both number and weight were obtained by multiplying discards (numbers) and discards (lbs.) by the fleet and year specific discard mortality rates shown in **Table 1**.

Assumptions:

* Recreational estimates were provided in MRIP units with charter and APAIS calibrations. The FES calibration was not applied.
* Discards in pounds were computed using the average weight, by fishing mode and year, computed within the stock assessment.
* Dead discards in numbers and weight were estimated by applying the release mortality used for that assessment.

Limitations:

* Approach #2 does not include estimates after 2016. Discards in numbers were estimated within the stock assessment with associated uncertainty. Therefore, the estimates may differ significantly from the observations provided by SEDAR data providers.

**Greater Amberjack**

Greater amberjack recreational discards were estimated using Approaches #1 and #2 (described above). For approach #1, the most recent MRIP estimates were used for Sub-Region 7 (the Gulf of Mexico). Data from the Florida Keys was excluded, as it was in the stock assessment. Discards in weight were estimated using the average weight of discarded fish as estimated by the most recent stock assessment model, by year and fishing mode. Dead discards in numbers and weight were estimated by applying the release mortality rate. For all recreational fishing modes, the most recent stock assessment assumed 20% release mortality rate. The results are summarized in **Tables 4 and 5**.

Assumptions:

* Recreational estimates were provided in MRIP units with charter and APAIS calibrations. The FES calibration was not applied.
* Discards in pounds were computed using the average weight, by fishing mode and year, computed within the stock assessment.
* Dead discards in numbers and weight were estimated by applying the release mortality used for that assessment.

Limitations:

* Approach #1 does not include TX or Headboat estimates because they were not available at the time of this analysis. The average weight of discards from 2015 was carried forward through 2018.
* Approach #2 includes TX data and HB, but does not include estimates after 2015. Discards in numbers were estimated within the stock assessment with associated uncertainty. Therefore, the estimates may differ significantly from the observations provided by SEDAR data providers.

**Gag Grouper**

Gag grouper recreational discards were estimated using Approaches #1 and #2 (described above). For approach #1, the most recent MRIP estimates were used for Sub-Region 7 (the Gulf of Mexico). Data from the Florida Keys was excluded, as it was in the stock assessment. Discards in weight were estimated using the average weight of discarded fish as estimated by the most recent stock assessment model, by year and fishing mode. Dead discards in numbers and weight were estimated by applying the release mortality rate. For all recreational fishing modes, the most recent stock assessment assumed 12% release mortality rate. The results are summarized in **Tables 6 and 7**.

Assumptions:

* Recreational estimates were provided in MRIP units with charter and APAIS calibrations. The FES calibration was not applied.
* Discards in pounds were computed using the average weight, by fishing mode and year, computed within the stock assessment.
* Dead discards in numbers and weight were estimated by applying the release mortality used for that assessment.

Limitations:

* Approach #1 does not include TX or Headboat estimates because they were not available at the time of this analysis, and the average weight of discards from 2015 was carried forward through 2018.
* Approach #2 includes TX and HB. Discards in numbers were estimated within the stock assessment with associated uncertainty. Therefore, the estimates may differ significantly from the observations provided by SEDAR data providers.

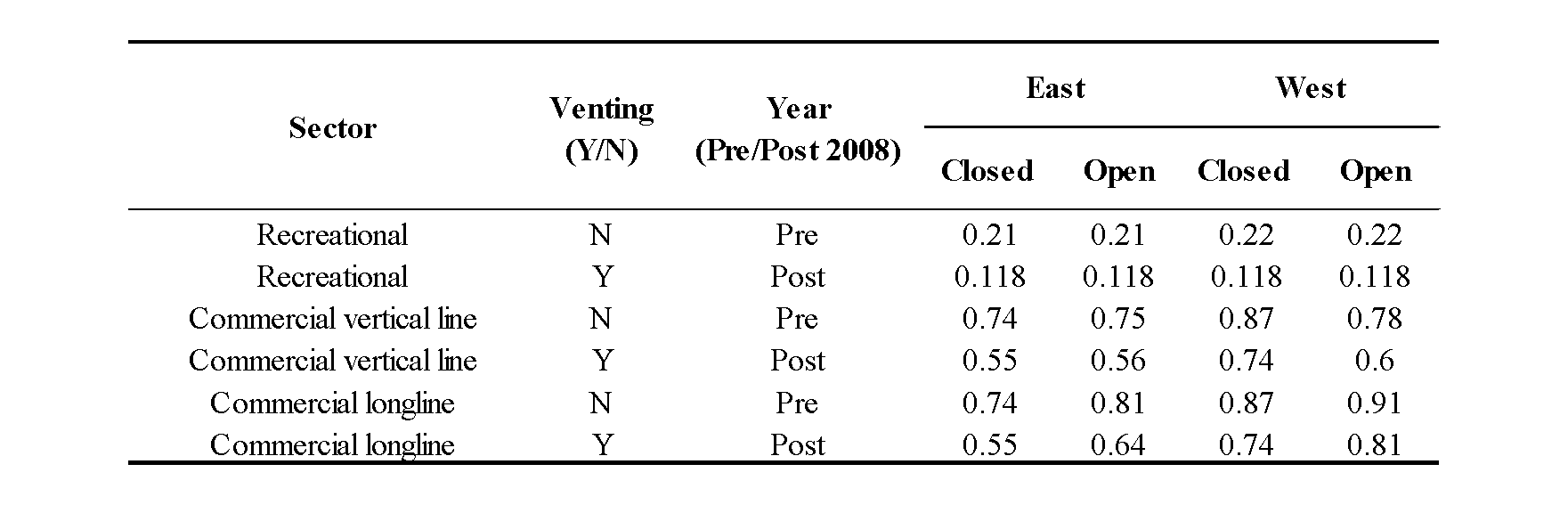
**REFERENCES**:

SEDAR 2005. Southeast Data, Assessment, and Review: Stock Assessment Report of SEDAR 7: Gulf of Mexico Red Snapper. SEDAR 7. One Southpark Circle #306, Charleston, SC 29414

SEDAR. 2013. SEDAR 31 - Gulf of Mexico Red Snapper Stock Assessment Report. SEDAR, North Charleston SC. 1103 pp.

SEDAR 2018. SEDAR 52 – Gulf of Mexico Red Snapper Stock Assessment Report. SEDAR, North Charleston SC. 413 pp.

**Table 1**. The fraction of discarded red snapper that die (release mortality rate) has been found to increase with depth and decrease with venting. Accordingly, the release mortality rates used in the stock assessment were computed based on the average depth fished and whether or not venting was required (venting became mandatory in 2008). The values used are summarized by sector, season (open or closed), and region (east and west of the Mississippi River). Although venting has not been mandatory since 2013, limited information was available to determine discard mortality rates for the most recent timeblock. Therefore, the values from the mandatory venting period were maintained from 2013 - 2016 (see text for more information). The recreational discard mortality applies to all recreational fleets (including headboat).



**Table 2.** Annual estimates of the total number of red snapper discards, dead discards and the weight in pounds of both for the private recreational fishery operating in the Gulf of Mexico.



**Table 3.** Annual estimates of the total number of red snapper discards, dead discards and the weight in pounds of both for the for-hire fishery (charter boats and headboats) operating in the Gulf of Mexico.



**Table 4.** Greater amberjack total recreational discards in numbers from May 2019 MRIP estimates (Approach #1), release mortality, dead discards in numbers, average weight of discards and dead discards in pounds.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Total Discards in Numbers | | |  | Dead Discards in Numbers | | | Average Weight in LBS | | | Dead Discards in LBS | | |
| YEAR | Charter | Private | Shore | Release Mortality | Charter | Private | Shore | Charter | Private | Shore | Charter | Private | Shore |
| 2004 | 24,591 | 143,421 | 14,587 | 20% | 4,918 | 28,684 | 2,917 | 5.74 | 5.74 | n/a | 28,215 | 164,560 | n/a |
| 2005 | 20,867 | 169,873 |  | 20% | 4,173 | 33,975 | - | 6.33 | 6.33 | n/a | 26,430 | 215,160 | n/a |
| 2006 | 25,114 | 133,847 | 1,578 | 20% | 5,023 | 26,769 | 316 | 6.14 | 6.14 | n/a | 30,863 | 164,486 | n/a |
| 2007 | 31,055 | 151,278 | 648 | 20% | 6,211 | 30,256 | 130 | 5.40 | 5.40 | n/a | 33,514 | 163,259 | n/a |
| 2008 | 57,063 | 103,914 | 14,360 | 20% | 11,413 | 20,783 | 2,872 | 5.89 | 5.89 | n/a | 67,179 | 122,335 | n/a |
| 2009 | 57,024 | 79,894 |  | 20% | 11,405 | 15,979 | - | 6.85 | 6.85 | n/a | 78,067 | 109,377 | n/a |
| 2010 | 34,505 | 268,044 | 8,281 | 20% | 6,901 | 53,609 | 1,656 | 7.18 | 7.18 | n/a | 49,517 | 384,662 | n/a |
| 2011 | 42,659 | 132,592 | 23,588 | 20% | 8,532 | 26,518 | 4,718 | 7.62 | 7.62 | n/a | 65,048 | 202,182 | n/a |
| 2012 | 27,060 | 73,137 | 940 | 20% | 5,412 | 14,627 | 188 | 7.05 | 7.05 | n/a | 38,153 | 103,118 | n/a |
| 2013 | 43,661 | 239,950 | 615 | 20% | 8,732 | 47,990 | 123 | 7.28 | 7.28 | n/a | 63,559 | 349,305 | n/a |
| 2014 | 70,301 | 104,990 | - | 20% | 14,060 | 20,998 | - | 7.03 | 7.03 | n/a | 98,859 | 147,639 | n/a |
| 2015 | 63,040 | 185,527 | 1,449 | 20% | 12,608 | 37,105 | 290 | 6.93 | 6.93 | n/a | 87,423 | 257,286 | n/a |
| 2016 | 64,725 | 169,791 |  | 20% | 12,945 | 33,958 | - | 6.93 | 6.93 | n/a | 89,760 | 235,464 | n/a |
| 2017 | 76,617 | 128,015 |  | 20% | 15,323 | 25,603 | - | 6.93 | 6.93 | n/a | 106,251 | 177,529 | n/a |
| 2018 | 27,894 | 77,300 |  | 20% | 5,579 | 15,460 | - | 6.93 | 6.93 | n/a | 38,683 | 107,198 | n/a |

**Table 5.** Greater amberjack estimates of total recreational discards in pounds and numbers, average weight of discards, release mortality, and dead discards in pounds and numbers from the stock assessment predictions (Approach #2).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **COMBINED CHARTER/PRIVATE BOAT** | | | | | |
| YEAR | Total Discarded\_LBS | Total Discarded\_Num | Avg Weight\_LBS | Release Mortality | DEAD DISCARDS\_LBS | DEAD DISCARDS\_NUM |
| 2004 | 1,048,187 | 182,708 | 5.74 | 20% | 209,637 | 36,542 |
| 2005 | 1,121,349 | 177,065 | 6.33 | 20% | 224,270 | 35,413 |
| 2006 | 610,237 | 99,313 | 6.14 | 20% | 122,047 | 19,863 |
| 2007 | 451,092 | 83,597 | 5.40 | 20% | 90,218 | 16,719 |
| 2008 | 923,425 | 156,876 | 5.89 | 20% | 184,685 | 31,375 |
| 2009 | 1,836,396 | 268,279 | 6.85 | 20% | 367,279 | 53,656 |
| 2010 | 1,661,307 | 231,530 | 7.18 | 20% | 332,261 | 46,306 |
| 2011 | 931,441 | 122,169 | 7.62 | 20% | 186,288 | 24,434 |
| 2012 | 947,689 | 134,431 | 7.05 | 20% | 189,538 | 26,886 |
| 2013 | 1,195,495 | 164,246 | 7.28 | 20% | 239,099 | 32,849 |
| 2014 | 1,057,267 | 150,370 | 7.03 | 20% | 211,453 | 30,074 |
| 2015 | 1,364,805 | 196,830 | 6.93 | 20% | 272,961 | 39,366 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **HEADBOAT** | | | | | |
| YEAR | Weight Discarded\_LBS | Number Discarded | Avg Weight\_LBS | Release Mortality | DEAD DISCARDS\_LBS | DEAD DISCARDS\_NUM |
| 2004 | 52,476 | 10,332 | 5.08 | 20% | 10,495 | 2,066 |
| 2005 | 43,996 | 7,621 | 5.77 | 20% | 8,799 | 1,524 |
| 2006 | 44,619 | 8,137 | 5.48 | 20% | 8,924 | 1,627 |
| 2007 | 49,534 | 10,405 | 4.76 | 20% | 9,907 | 2,081 |
| 2008 | 60,424 | 11,445 | 5.28 | 20% | 12,085 | 2,289 |
| 2009 | 128,794 | 19,844 | 6.49 | 20% | 25,759 | 3,969 |
| 2010 | 60,914 | 8,814 | 6.91 | 20% | 12,183 | 1,763 |
| 2011 | 61,539 | 8,214 | 7.49 | 20% | 12,308 | 1,643 |
| 2012 | 72,495 | 10,563 | 6.86 | 20% | 14,499 | 2,113 |
| 2013 | 63,542 | 8,933 | 7.11 | 20% | 12,708 | 1,787 |
| 2014 | 40,104 | 5,907 | 6.79 | 20% | 8,021 | 1,181 |
| 2015 | 61,685 | 9,246 | 6.67 | 20% | 12,337 | 1,849 |

**Table 6.** Gag grouper total recreational discards in numbers from May 2019 MRIP estimates (Approach #1), release mortality, dead discards in numbes, average weight of discards and dead discards in pounds.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Total Discards in Numbers | | |  | Dead Discards in Numbers | | | Average Weight in LBS | | | Dead Discards in LBS | | |
| YEAR | Charter | Private | Shore | Release Mortality | Charter | Private | Shore | Charter | Private | Shore | Charter | Private | Shore |
| 2004 | 337,692 | 3,368,454 | 160,428 | 12% | 40,523 | 404,214 | 19,251 | 2.49 | 1.63 | N/A | 100,927 | 659,552 | N/A |
| 2005 | 337,978 | 1,860,011 | 178,522 | 12% | 40,557 | 223,201 | 21,423 | 2.54 | 1.59 | N/A | 103,041 | 355,389 | N/A |
| 2006 | 166,273 | 1,557,024 | 154,680 | 12% | 19,953 | 186,843 | 18,562 | 2.37 | 1.27 | N/A | 47,298 | 237,591 | N/A |
| 2007 | 118,871 | 2,165,058 | 397,729 | 12% | 14,265 | 259,807 | 47,727 | 2.23 | 1.23 | N/A | 31,841 | 318,793 | N/A |
| 2008 | 310,980 | 3,400,819 | 392,663 | 12% | 37,318 | 408,098 | 47,120 | 2.26 | 1.40 | N/A | 84,179 | 570,098 | N/A |
| 2009 | 271,327 | 2,210,175 | 272,312 | 12% | 32,559 | 265,221 | 32,677 | 2.47 | 1.63 | N/A | 80,378 | 431,965 | N/A |
| 2010 | 314,144 | 1,549,993 | 149,723 | 12% | 37,697 | 185,999 | 17,967 | 2.58 | 1.53 | N/A | 97,423 | 285,170 | N/A |
| 2011 | 191,462 | 888,979 | 82,995 | 12% | 22,975 | 106,677 | 9,959 | 4.27 | 2.23 | N/A | 98,085 | 237,581 | N/A |
| 2012 | 167,317 | 699,957 | 60,663 | 12% | 20,078 | 83,995 | 7,280 | 4.82 | 2.91 | N/A | 96,806 | 244,125 | N/A |
| 2013 | 231,727 | 859,451 | 77,435 | 12% | 27,807 | 103,134 | 9,292 | 5.82 | 2.84 | N/A | 161,707 | 293,309 | N/A |
| 2014 | 74,640 | 611,895 | 107,336 | 12% | 8,957 | 73,427 | 12,880 | 6.18 | 2.53 | N/A | 55,353 | 185,944 | N/A |
| 2015 | 66,220 | 354,985 | 56,693 | 12% | 7,946 | 42,598 | 6,803 | 6.09 | 2.53 | N/A | 48,391 | 107,940 | N/A |
| 2016 | 90,505 | 580,445 | 82,624 | 12% | 10,861 | 69,653 | 9,915 | 6.16 | 2.40 | N/A | 66,893 | 167,491 | N/A |
| 2017 | 177,044 | 791,093 | 56,513 | 12% | 21,245 | 94,931 | 6,782 | 5.99 | 2.19 | N/A | 127,218 | 207,619 | N/A |
| 2018 | 126,194 | 709,120 | 35,304 | 12% | 15,143 | 85,094 | 4,236 | 5.57 | 2.11 | N/A | 84,283 | 179,807 | N/A |

**Table 7.** Gag Grouper estimates of total recreational discards in pounds and numbers, average weight of discards, release mortality, and dead discards in pounds and numbers from the stock assessment predictions (Approach #2).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **HEADBOAT** | | | | | |
| YEAR | Total Discarded\_LBS | Total Discarded\_Num | Avg Weight\_LBS | Release Mortality | DEAD DISCARDS\_LBS | DEAD DISCARDS\_NUM |
| 2004 | 143,604 | 67,600 | 2.12 | 12% | 17,233 | 8,112 |
| 2005 | 87,732 | 41,328 | 2.12 | 12% | 10,528 | 4,959 |
| 2006 | 38,571 | 20,489 | 1.88 | 12% | 4,629 | 2,459 |
| 2007 | 90,755 | 51,373 | 1.77 | 12% | 10,891 | 6,165 |
| 2008 | 119,774 | 64,612 | 1.85 | 12% | 14,373 | 7,753 |
| 2009 | 91,254 | 43,355 | 2.10 | 12% | 10,950 | 5,203 |
| 2010 | 64,110 | 29,823 | 2.15 | 12% | 7,693 | 3,579 |
| 2011 | 95,774 | 32,439 | 2.95 | 12% | 11,493 | 3,893 |
| 2012 | 98,554 | 27,387 | 3.60 | 12% | 11,826 | 3,286 |
| 2013 | 82,150 | 19,947 | 4.12 | 12% | 9,858 | 2,394 |
| 2014 | 99,557 | 25,660 | 3.88 | 12% | 11,947 | 3,079 |
| 2015 | 70,047 | 18,470 | 3.79 | 12% | 8,406 | 2,216 |
| 2016 | 71,267 | 18,880 | 3.77 | 12% | 8,552 | 2,266 |
| 2017 | 243,773 | 69,932 | 3.49 | 12% | 29,253 | 8,392 |
| 2018 | 251,070 | 76,979 | 3.26 | 12% | 30,128 | 9,238 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **CHARTERBOAT** | | | | | |
| YEAR | Weight Discarded\_LBS | Number Discarded | Avg Weight\_LBS | Release Mortality | DEAD DISCARDS\_LBS | DEAD DISCARDS\_NUM |
| 2004 | 653,465 | 262,373 | 2.49 | 12% | 78,416 | 31,485 |
| 2005 | 708,499 | 278,869 | 2.54 | 12% | 85,020 | 33,464 |
| 2006 | 362,173 | 152,784 | 2.37 | 12% | 43,461 | 18,334 |
| 2007 | 246,360 | 110,368 | 2.23 | 12% | 29,563 | 13,244 |
| 2008 | 670,412 | 297,203 | 2.26 | 12% | 80,449 | 35,664 |
| 2009 | 362,151 | 146,699 | 2.47 | 12% | 43,458 | 17,604 |
| 2010 | 265,070 | 102,567 | 2.58 | 12% | 31,808 | 12,308 |
| 2011 | 498,577 | 116,787 | 4.27 | 12% | 59,829 | 14,014 |
| 2012 | 2,291,550 | 475,277 | 4.82 | 12% | 274,986 | 57,033 |
| 2013 | 1,017,136 | 174,908 | 5.82 | 12% | 122,056 | 20,989 |
| 2014 | 506,112 | 81,896 | 6.18 | 12% | 60,733 | 9,827 |
| 2015 | 766,863 | 125,927 | 6.09 | 12% | 92,024 | 15,111 |
| 2016 | 788,603 | 128,037 | 6.16 | 12% | 94,632 | 15,364 |
| 2017 | 2,235,714 | 373,363 | 5.99 | 12% | 268,286 | 44,804 |
| 2018 | 2,218,765 | 398,653 | 5.57 | 12% | 266,252 | 47,838 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **PRIVATE BOAT** | | | | | |
| YEAR | Weight Discarded\_LBS | Number Discarded | Avg Weight\_LBS | Release Mortality | DEAD DISCARDS\_LBS | DEAD DISCARDS\_NUM |
| 2004 | 5,332,204 | 3,267,905 | 1.63 | 12% | 639,864 | 392,149 |
| 2005 | 3,053,377 | 1,917,665 | 1.59 | 12% | 366,405 | 230,120 |
| 2006 | 1,802,233 | 1,417,287 | 1.27 | 12% | 216,268 | 170,074 |
| 2007 | 3,307,686 | 2,695,666 | 1.23 | 12% | 396,922 | 323,480 |
| 2008 | 6,888,115 | 4,930,782 | 1.40 | 12% | 826,574 | 591,694 |
| 2009 | 2,550,439 | 1,565,935 | 1.63 | 12% | 306,053 | 187,912 |
| 2010 | 1,546,349 | 1,008,589 | 1.53 | 12% | 185,562 | 121,031 |
| 2011 | 3,535,756 | 1,587,608 | 2.23 | 12% | 424,291 | 190,513 |
| 2012 | 3,089,385 | 1,062,949 | 2.91 | 12% | 370,726 | 127,554 |
| 2013 | 4,831,145 | 1,698,743 | 2.84 | 12% | 579,737 | 203,849 |
| 2014 | 2,525,207 | 997,177 | 2.53 | 12% | 303,025 | 119,661 |
| 2015 | 2,707,573 | 1,068,536 | 2.53 | 12% | 324,909 | 128,224 |
| 2016 | 2,727,364 | 1,134,210 | 2.40 | 12% | 327,284 | 136,105 |
| 2017 | 9,814,329 | 4,487,477 | 2.19 | 12% | 1,177,719 | 538,497 |
| 2018 | 10,262,951 | 4,856,974 | 2.11 | 12% | 1,231,554 | 582,837 |