

SEDAR-24 South Atlantic Red Snapper:
Management quantities and projections requested by the SSC and SERO

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Introduction

In the SEDAR-24 CIE report, the Review Panel concluded “The Review Panel suggested using the AW base-case model to provide an assessment of the red snapper stock, but cautions that this was one realization of a number of plausible runs.” The SSC followed up on this conclusion to identify three additional plausible runs; all of these runs increased the weighting of the headboat index relative to other data components.

Methods

The weighting given to the headboat index is controlled by the annual CV_t . In the model, the CV applied was,

$$CV_t = CV_t^d / \omega$$

where CV_t^d was the annual CV estimated by the data workshop and ω was a user-supplied weight. Larger values of ω result in smaller CV_t and, consequently, more emphasis on the index.

In the base-case configuration, as reviewed by the SEDAR-24 RW, weighting of data components was accomplished through an iterative re-weighting strategy. That strategy provided a headboat index weight of $\omega = 0.11$. The RW panel requested additional runs using $\omega = 0.20$, $\omega = 0.25$, $\omega = 0.30$, and the SSC selected those runs as plausible alternatives.

In this report, the alternative model runs are labeled wgt11, wgt20, wgt25, and wgt30, with labels indicating the value of ω applied to the headboat index. In addition to management quantities from those runs, this report provides results from 10-year, deterministic projections using four different fishing mortality rates: F_{msy} , F_{30} , 98% of F_{30} , and $F_{current}$ but with a moratorium applied. Projection methods and caveats about results are described in the SEDAR-24 AW report. One caveat worth reiterating is that projections of population and fishery dynamics are highly uncertain. In the deterministic projections of this report, the uncertainty surrounding expected values is not quantified.

Results

Benchmarks and other management quantities from the various runs are presented in Table 1. Predicted landings and discards from the various runs are shown in Tables 2–5. Deterministic projection results from wgt11 are shown in Tables 6a,b,c,d; results from wgt20 in Tables 7a,b,c,d; results from wgt25 in Tables 8a,b,c,d; and results from wgt30 in Tables 9a,b,c,d.

Discussion

The benchmarks are conditional on selectivities estimated at the end of the assessment period. Changes in relative contributions toward mortality from the various fleets would alter the aggregate selectivity and thus benchmarks. Such changes have likely occurred as a result of the current moratorium, and as a result, moratorium fishing mortality rates are not directly comparable to F_{msy} or its proxies.

Table 1. Estimated status indicators, benchmarks, and related quantities from the Beaufort Assessment Model. Values are from runs with component weights as in the base-case model of the AW report (wgt11), and from runs with increased weight on the headboat index (wgt20, wgt25, and wgt30). Estimates of yield do not include discards; Dmsy represents discard mortalities expected when fishing at Fmsy. Spawning stock biomass (SSB) is measured by total gonad weight of mature females.

| Quantity | Units | wgt11 | wgt20 | wgt25 | wgt30 |
|-------------------|-----------------|-------|-------|-------|-------|
| Fmsy | y ⁻¹ | 0.178 | 0.188 | 0.196 | 0.206 |
| 85%Fmsy | y ⁻¹ | 0.151 | 0.160 | 0.166 | 0.175 |
| 75%Fmsy | y ⁻¹ | 0.133 | 0.141 | 0.147 | 0.155 |
| 65%Fmsy | y ⁻¹ | 0.115 | 0.122 | 0.127 | 0.134 |
| F30% | y ⁻¹ | 0.170 | 0.183 | 0.192 | 0.204 |
| F40% | y ⁻¹ | 0.125 | 0.134 | 0.140 | 0.149 |
| F50% | y ⁻¹ | 0.092 | 0.098 | 0.103 | 0.109 |
| Bmsy | mt | 13632 | 14180 | 14429 | 14634 |
| SSBmsy | mt | 156 | 162 | 165 | 168 |
| MSST | mt | 144 | 149 | 152 | 154 |
| MSY | 1000 lb | 1842 | 1891 | 1908 | 1926 |
| Dmsy | 1000 fish | 67 | 71 | 73 | 75 |
| Rmsy | 1000 age-1 fish | 584 | 599 | 604 | 608 |
| Y at 85%Fmsy | 1000 lb | 1821 | 1870 | 1887 | 1905 |
| Y at 75%Fmsy | 1000 lb | 1780 | 1829 | 1846 | 1863 |
| Y at 65%Fmsy | 1000 lb | 1712 | 1760 | 1777 | 1794 |
| F(2007-2009)/Fmsy | - | 4.12 | 3.27 | 2.98 | 2.76 |
| SSB(2009)/SSBmsy | - | 0.09 | 0.11 | 0.12 | 0.14 |

Table 2a. Estimated recent landings in whole weight (1000 lb) for commercial lines (L.cl), commercial dive (L.cd), for hire (L.hb), and private recreational (L.pvt) from run with headboat index weight of $\omega = 0.11$.

| Year | L.cl | L.cd | L.hb | L.pvt | Total |
|------|--------|-------|--------|--------|---------|
| 2000 | 92.13 | 10.38 | 146.29 | 441.08 | 689.87 |
| 2001 | 175.32 | 18.24 | 151.48 | 280.75 | 625.78 |
| 2002 | 163.11 | 22.10 | 219.31 | 247.60 | 652.12 |
| 2003 | 118.79 | 17.45 | 202.00 | 136.94 | 475.19 |
| 2004 | 149.73 | 19.65 | 236.07 | 244.04 | 649.48 |
| 2005 | 117.99 | 9.34 | 224.78 | 206.96 | 559.07 |
| 2006 | 80.29 | 4.16 | 183.87 | 156.50 | 424.82 |
| 2007 | 104.72 | 7.51 | 187.91 | 366.92 | 667.06 |
| 2008 | 240.48 | 6.30 | 301.94 | 616.19 | 1164.92 |
| 2009 | 340.89 | 8.01 | 382.32 | 708.17 | 1439.40 |

Table 2b. Estimated recent dead discards in whole weight (1000 lb) for commercial lines (D.cl), for hire (D.hb), and private recreational (D.pvt) from run with headboat index weight of $\omega = 0.11$.

| Year | D.cl | D.hb | D.pvt | Total |
|------|-------|-------|--------|--------|
| 2000 | 22.52 | 24.02 | 156.32 | 202.87 |
| 2001 | 25.81 | 29.15 | 150.80 | 205.76 |
| 2002 | 61.00 | 23.25 | 90.28 | 174.53 |
| 2003 | 18.51 | 15.79 | 96.22 | 130.53 |
| 2004 | 6.58 | 30.99 | 128.66 | 166.23 |
| 2005 | 7.12 | 44.70 | 68.56 | 120.38 |
| 2006 | 7.34 | 9.14 | 43.31 | 59.80 |
| 2007 | 15.24 | 85.09 | 231.43 | 331.76 |
| 2008 | 21.44 | 55.76 | 310.78 | 387.97 |
| 2009 | 30.33 | 34.88 | 173.44 | 238.65 |

Table 3a. Estimated recent landings in whole weight (1000 lb) for commercial lines (L.cl), commercial dive (L.cd), for hire (L.hb), and private recreational (L.pvt) from run with headboat index weight of $\omega = 0.20$.

| Year | L.cl | L.cd | L.hb | L.pvt | Total |
|------|--------|-------|--------|--------|---------|
| 2000 | 92.09 | 10.37 | 145.95 | 435.65 | 684.06 |
| 2001 | 175.23 | 18.24 | 148.67 | 274.31 | 616.45 |
| 2002 | 163.07 | 22.10 | 214.40 | 241.58 | 641.14 |
| 2003 | 118.77 | 17.45 | 200.25 | 135.59 | 472.06 |
| 2004 | 149.70 | 19.65 | 227.16 | 233.93 | 630.43 |
| 2005 | 117.99 | 9.34 | 216.68 | 199.01 | 543.03 |
| 2006 | 80.30 | 4.16 | 185.58 | 157.14 | 427.18 |
| 2007 | 104.72 | 7.51 | 195.48 | 371.14 | 678.85 |
| 2008 | 240.53 | 6.30 | 296.43 | 601.97 | 1145.22 |
| 2009 | 340.96 | 8.01 | 374.62 | 692.68 | 1416.28 |

Table 3b. Estimated recent dead discards in whole weight (1000 lb) for commercial lines (D.cl), for hire (D.hb), and private recreational (D.pvt) from run with headboat index weight of $\omega = 0.20$.

| Year | D.cl | D.hb | D.pvt | Total |
|------|-------|-------|--------|--------|
| 2000 | 22.24 | 23.65 | 153.86 | 199.75 |
| 2001 | 25.54 | 29.14 | 150.71 | 205.39 |
| 2002 | 60.56 | 22.35 | 86.77 | 169.68 |
| 2003 | 17.88 | 15.69 | 95.59 | 129.16 |
| 2004 | 6.67 | 31.67 | 131.48 | 169.82 |
| 2005 | 7.15 | 45.06 | 69.10 | 121.31 |
| 2006 | 7.09 | 8.93 | 42.30 | 58.32 |
| 2007 | 15.08 | 83.76 | 227.86 | 326.70 |
| 2008 | 21.32 | 56.51 | 315.08 | 392.91 |
| 2009 | 30.75 | 36.51 | 181.51 | 248.76 |

Table 4a. Estimated recent landings in whole weight (1000 lb) for commercial lines (L.cl), commercial dive (L.cd), for hire (L.hb), and private recreational (L.pvt) from run with headboat index weight of $\omega = 0.25$.

| Year | L.cl | L.cd | L.hb | L.pvt | Total |
|------|--------|-------|--------|--------|---------|
| 2000 | 92.07 | 10.37 | 145.41 | 432.55 | 680.40 |
| 2001 | 175.20 | 18.24 | 147.28 | 271.36 | 612.07 |
| 2002 | 163.06 | 22.10 | 211.63 | 238.31 | 635.10 |
| 2003 | 118.77 | 17.45 | 199.79 | 135.26 | 471.26 |
| 2004 | 149.70 | 19.65 | 218.49 | 224.66 | 612.49 |
| 2005 | 118.00 | 9.34 | 210.96 | 193.59 | 531.90 |
| 2006 | 80.30 | 4.16 | 186.24 | 157.43 | 428.14 |
| 2007 | 104.73 | 7.51 | 198.55 | 372.95 | 683.74 |
| 2008 | 240.55 | 6.30 | 296.01 | 600.35 | 1143.21 |
| 2009 | 340.99 | 8.01 | 372.62 | 688.71 | 1410.34 |

Table 4b. Estimated recent dead discards in whole weight (1000 lb) for commercial lines (D.cl), for hire (D.hb), and private recreational (D.pvt) from run with headboat index weight of $\omega = 0.25$.

| Year | D.cl | D.hb | D.pvt | Total |
|------|-------|-------|--------|--------|
| 2000 | 22.05 | 23.41 | 152.30 | 197.75 |
| 2001 | 25.33 | 29.19 | 151.00 | 205.52 |
| 2002 | 60.19 | 21.55 | 83.68 | 165.43 |
| 2003 | 17.36 | 15.74 | 95.87 | 128.98 |
| 2004 | 6.75 | 32.27 | 133.94 | 172.96 |
| 2005 | 7.15 | 45.18 | 69.29 | 121.63 |
| 2006 | 6.98 | 8.91 | 42.19 | 58.07 |
| 2007 | 14.99 | 82.71 | 225.03 | 322.73 |
| 2008 | 21.13 | 56.51 | 315.13 | 392.77 |
| 2009 | 30.77 | 37.05 | 184.23 | 252.05 |

Table 5a. Estimated recent landings in whole weight (1000 lb) for commercial lines (L.cl), commercial dive (L.cd), for hire (L.hb), and private recreational (L.pvt) from run with headboat index weight of $\omega = 0.30$.

| Year | L.cl | L.cd | L.hb | L.pvt | Total |
|------|--------|-------|--------|--------|---------|
| 2000 | 92.06 | 10.37 | 145.64 | 432.42 | 680.49 |
| 2001 | 175.19 | 18.24 | 146.41 | 269.52 | 609.35 |
| 2002 | 163.06 | 22.09 | 208.88 | 235.12 | 629.15 |
| 2003 | 118.77 | 17.45 | 200.15 | 135.50 | 471.87 |
| 2004 | 149.71 | 19.65 | 210.87 | 216.60 | 596.82 |
| 2005 | 118.01 | 9.34 | 207.56 | 190.38 | 525.29 |
| 2006 | 80.30 | 4.16 | 190.37 | 160.75 | 435.58 |
| 2007 | 104.73 | 7.51 | 203.75 | 379.58 | 695.58 |
| 2008 | 240.58 | 6.30 | 299.58 | 607.15 | 1153.61 |
| 2009 | 341.01 | 8.01 | 372.86 | 688.99 | 1410.88 |

Table 5b. Estimated recent dead discards in whole weight (1000 lb) for commercial lines (D.cl), for hire (D.hb), and private recreational (D.pvt) from run with headboat index weight of $\omega = 0.30$.

| Year | D.cl | D.hb | D.pvt | Total |
|------|-------|-------|--------|--------|
| 2000 | 21.79 | 23.06 | 150.00 | 194.85 |
| 2001 | 25.01 | 29.11 | 150.57 | 204.69 |
| 2002 | 59.68 | 20.88 | 81.08 | 161.64 |
| 2003 | 16.92 | 15.75 | 95.92 | 128.58 |
| 2004 | 6.77 | 32.71 | 135.77 | 175.25 |
| 2005 | 7.14 | 45.15 | 69.25 | 121.54 |
| 2006 | 6.94 | 8.98 | 42.54 | 58.45 |
| 2007 | 14.85 | 80.95 | 220.28 | 316.08 |
| 2008 | 20.78 | 56.10 | 312.89 | 389.76 |
| 2009 | 30.64 | 37.34 | 185.67 | 253.66 |

Table 6a. Projection results (expected values) with $F=F_{msy}$, extended from assessment model configuration with component weights as in the AW report, including headboat index weight of $\omega = 0.11$. F is fishing mortality rate (per yr), SSB is mid-year spawning stock (mt), R is recruits (1000 age-1 fish), D is discard mortalities (1000 fish or 1000 lb whole weight), L is landings (1000 fish or 1000 lb whole weight), and sum L is cumulative landings.

| Year | F | SSB(mt) | R(1000) | D(1000) | D(klb) | L(1000) | L(klb) | Sum L(klb) |
|------|-------|---------|---------|---------|--------|---------|--------|------------|
| 2010 | 0.416 | 11.49 | 235 | 62 | 306 | 0 | 0 | 0 |
| 2011 | 0.178 | 13.76 | 223 | 22 | 39 | 22 | 235 | 235 |
| 2012 | 0.178 | 15.53 | 251 | 26 | 52 | 29 | 278 | 513 |
| 2013 | 0.178 | 17.62 | 270 | 29 | 56 | 35 | 321 | 834 |
| 2014 | 0.178 | 20.11 | 290 | 31 | 62 | 41 | 378 | 1212 |
| 2015 | 0.178 | 22.98 | 312 | 34 | 66 | 47 | 436 | 1648 |
| 2016 | 0.178 | 26.17 | 335 | 36 | 71 | 52 | 491 | 2139 |
| 2017 | 0.178 | 29.71 | 356 | 39 | 76 | 57 | 546 | 2685 |
| 2018 | 0.178 | 33.56 | 377 | 41 | 81 | 62 | 602 | 3287 |
| 2019 | 0.178 | 37.68 | 397 | 44 | 86 | 67 | 660 | 3947 |

Table 6b. Projection results (expected values) with $F=F_{30}$, extended from assessment model configuration with component weights as in the AW report, including headboat index weight of $\omega = 0.11$. F is fishing mortality rate (per yr), SSB is mid-year spawning stock (mt), R is recruits (1000 age-1 fish), D is discard mortalities (1000 fish or 1000 lb whole weight), L is landings (1000 fish or 1000 lb whole weight), and sum L is cumulative landings.

| Year | F | SSB(mt) | R(1000) | D(1000) | D(klb) | L(1000) | L(klb) | Sum L(klb) |
|------|-------|---------|---------|---------|--------|---------|--------|------------|
| 2010 | 0.416 | 11.49 | 235 | 62 | 306 | 0 | 0 | 0 |
| 2011 | 0.170 | 13.76 | 223 | 21 | 37 | 21 | 226 | 226 |
| 2012 | 0.170 | 15.61 | 251 | 25 | 50 | 28 | 268 | 494 |
| 2013 | 0.170 | 17.76 | 271 | 28 | 54 | 34 | 311 | 805 |
| 2014 | 0.170 | 20.35 | 292 | 30 | 59 | 40 | 367 | 1172 |
| 2015 | 0.170 | 23.33 | 314 | 33 | 64 | 45 | 425 | 1597 |
| 2016 | 0.170 | 26.66 | 337 | 35 | 69 | 51 | 480 | 2077 |
| 2017 | 0.170 | 30.35 | 359 | 38 | 74 | 56 | 535 | 2611 |
| 2018 | 0.170 | 34.39 | 381 | 40 | 79 | 61 | 591 | 3202 |
| 2019 | 0.170 | 38.72 | 401 | 42 | 84 | 66 | 649 | 3851 |

Table 6c. Projection results (expected values) with $F=0.98 \times F_{30}$, extended from assessment model configuration with component weights as in the AW report, including headboat index weight of $\omega = 0.11$. F is fishing mortality rate (per yr), SSB is mid-year spawning stock (mt), R is recruits (1000 age-1 fish), D is discard mortalities (1000 fish or 1000 lb whole weight), L is landings (1000 fish or 1000 lb whole weight), and sum L is cumulative landings.

| Year | F | SSB(mt) | R(1000) | D(1000) | D(klb) | L(1000) | L(klb) | Sum L(klb) |
|------|-------|---------|---------|---------|--------|---------|--------|------------|
| 2010 | 0.416 | 11.49 | 235 | 62 | 306 | 0 | 0 | 0 |
| 2011 | 0.167 | 13.76 | 223 | 20 | 36 | 20 | 222 | 222 |
| 2012 | 0.167 | 15.65 | 251 | 25 | 49 | 27 | 263 | 485 |
| 2013 | 0.167 | 17.83 | 271 | 27 | 53 | 33 | 306 | 791 |
| 2014 | 0.167 | 20.46 | 292 | 30 | 58 | 39 | 362 | 1153 |
| 2015 | 0.167 | 23.49 | 315 | 32 | 63 | 45 | 420 | 1573 |
| 2016 | 0.167 | 26.89 | 338 | 34 | 68 | 50 | 474 | 2047 |
| 2017 | 0.167 | 30.66 | 361 | 37 | 73 | 55 | 529 | 2576 |
| 2018 | 0.167 | 34.79 | 383 | 39 | 78 | 60 | 585 | 3162 |
| 2019 | 0.167 | 39.21 | 403 | 42 | 83 | 65 | 643 | 3805 |

Table 6d. Projection results (expected values) under continued moratorium, extended from assessment model configuration with component weights as in the AW report, including headboat index weight of $\omega = 0.11$. F is fishing mortality rate (per yr), SSB is mid-year spawning stock (mt), R is recruits (1000 age-1 fish), D is discard mortalities (1000 fish or 1000 lb whole weight), L is landings (1000 fish or 1000 lb whole weight), and sum L is cumulative landings. In these projections, the F applied corresponds to $F=0.9 \times F_{\text{current}}$ ($F_{\text{current}} = 0.73$) but decreased to reflect potential landings that are discarded and survive.

| Year | F | SSB(mt) | R(1000) | D(1000) | D(klb) | L(1000) | L(klb) | Sum L(klb) |
|------|-------|---------|---------|---------|--------|---------|--------|------------|
| 2010 | 0.416 | 11.49 | 235 | 62 | 306 | 0 | 0 | 0 |
| 2011 | 0.416 | 13.76 | 223 | 78 | 344 | 0 | 0 | 0 |
| 2012 | 0.416 | 15.21 | 251 | 91 | 395 | 0 | 0 | 0 |
| 2013 | 0.416 | 16.81 | 267 | 99 | 427 | 0 | 0 | 0 |
| 2014 | 0.416 | 18.59 | 283 | 108 | 473 | 0 | 0 | 0 |
| 2015 | 0.416 | 20.52 | 299 | 116 | 519 | 0 | 0 | 0 |
| 2016 | 0.416 | 22.57 | 316 | 124 | 563 | 0 | 0 | 0 |
| 2017 | 0.416 | 24.77 | 332 | 131 | 606 | 0 | 0 | 0 |
| 2018 | 0.416 | 27.12 | 347 | 139 | 650 | 0 | 0 | 0 |
| 2019 | 0.416 | 29.57 | 362 | 146 | 693 | 0 | 0 | 0 |

Table 7a. Projection results (expected values) with $F=F_{msy}$, extended from assessment model configuration with component weights as in the AW report, but headboat index weight increased to $\omega = 0.20$. F is fishing mortality rate (per yr), SSB is mid-year spawning stock (mt), R is recruits (1000 age-1 fish), D is discard mortalities (1000 fish or 1000 lb whole weight), L is landings (1000 fish or 1000 lb whole weight), and sum L is cumulative landings.

| Year | F | SSB(mt) | R(1000) | D(1000) | D(klb) | L(1000) | L(klb) | Sum L(klb) |
|------|-------|---------|---------|---------|--------|---------|--------|------------|
| 2010 | 0.35 | 16.88 | 282 | 65 | 345 | 0 | 0 | 0 |
| 2011 | 0.188 | 20.64 | 286 | 28 | 48 | 29 | 326 | 326 |
| 2012 | 0.188 | 23.27 | 320 | 35 | 67 | 38 | 386 | 711 |
| 2013 | 0.188 | 26.25 | 341 | 38 | 74 | 45 | 438 | 1149 |
| 2014 | 0.188 | 29.59 | 361 | 41 | 80 | 52 | 501 | 1650 |
| 2015 | 0.188 | 33.29 | 382 | 43 | 85 | 58 | 563 | 2213 |
| 2016 | 0.188 | 37.32 | 401 | 46 | 90 | 63 | 624 | 2837 |
| 2017 | 0.188 | 41.67 | 420 | 48 | 94 | 69 | 685 | 3522 |
| 2018 | 0.188 | 46.34 | 438 | 50 | 99 | 74 | 747 | 4269 |
| 2019 | 0.188 | 51.21 | 454 | 52 | 103 | 78 | 808 | 5077 |

Table 7b. Projection results (expected values) with $F=F_{30}$, extended from assessment model configuration with component weights as in the AW report, but headboat index weight increased to $\omega = 0.20$. F is fishing mortality rate (per yr), SSB is mid-year spawning stock (mt), R is recruits (1000 age-1 fish), D is discard mortalities (1000 fish or 1000 lb whole weight), L is landings (1000 fish or 1000 lb whole weight), and sum L is cumulative landings.

| Year | F | SSB(mt) | R(1000) | D(1000) | D(klb) | L(1000) | L(klb) | Sum L(klb) |
|------|-------|---------|---------|---------|--------|---------|--------|------------|
| 2010 | 0.35 | 16.88 | 282 | 65 | 345 | 0 | 0 | 0 |
| 2011 | 0.183 | 20.64 | 286 | 27 | 47 | 28 | 317 | 317 |
| 2012 | 0.183 | 23.34 | 320 | 34 | 65 | 37 | 376 | 693 |
| 2013 | 0.183 | 26.39 | 341 | 37 | 72 | 44 | 428 | 1121 |
| 2014 | 0.183 | 29.82 | 362 | 40 | 78 | 51 | 490 | 1612 |
| 2015 | 0.183 | 33.62 | 383 | 42 | 83 | 57 | 553 | 2164 |
| 2016 | 0.183 | 37.76 | 403 | 45 | 88 | 62 | 614 | 2778 |
| 2017 | 0.183 | 42.26 | 422 | 47 | 92 | 67 | 675 | 3454 |
| 2018 | 0.183 | 47.08 | 440 | 49 | 97 | 73 | 737 | 4190 |
| 2019 | 0.183 | 52.12 | 457 | 51 | 101 | 77 | 798 | 4988 |

Table 7c. Projection results (expected values) with $F=0.98 \times F_{30}$, extended from assessment model configuration with component weights as in the AW report, but headboat index weight increased to $\omega = 0.20$. F is fishing mortality rate (per yr), SSB is mid-year spawning stock (mt), R is recruits (1000 age-1 fish), D is discard mortalities (1000 fish or 1000 lb whole weight), L is landings (1000 fish or 1000 lb whole weight), and sum L is cumulative landings.

| Year | F | SSB(mt) | R(1000) | D(1000) | D(klb) | L(1000) | L(klb) | Sum L(klb) |
|------|-------|---------|---------|---------|--------|---------|--------|------------|
| 2010 | 0.35 | 16.88 | 282 | 65 | 345 | 0 | 0 | 0 |
| 2011 | 0.179 | 20.64 | 286 | 27 | 46 | 28 | 311 | 311 |
| 2012 | 0.179 | 23.4 | 320 | 33 | 64 | 37 | 370 | 680 |
| 2013 | 0.179 | 26.49 | 342 | 36 | 71 | 43 | 422 | 1102 |
| 2014 | 0.179 | 29.98 | 363 | 39 | 77 | 50 | 483 | 1585 |
| 2015 | 0.179 | 33.85 | 384 | 41 | 81 | 56 | 545 | 2131 |
| 2016 | 0.179 | 38.08 | 404 | 44 | 86 | 62 | 607 | 2737 |
| 2017 | 0.179 | 42.67 | 424 | 46 | 91 | 67 | 668 | 3405 |
| 2018 | 0.179 | 47.6 | 442 | 48 | 95 | 72 | 729 | 4135 |
| 2019 | 0.179 | 52.76 | 459 | 50 | 100 | 77 | 791 | 4926 |

Table 7d. Projection results (expected values) under continued moratorium, extended from assessment model configuration with component weights as in the AW report, including headboat index weight of $\omega = 0.20$. F is fishing mortality rate (per yr), SSB is mid-year spawning stock (mt), R is recruits (1000 age-1 fish), D is discard mortalities (1000 fish or 1000 lb whole weight), L is landings (1000 fish or 1000 lb whole weight), and sum L is cumulative landings. In these projections, the F applied corresponds to $F=0.9 \times F_{\text{current}}$ ($F_{\text{current}} = 0.61$) but decreased to reflect potential landings that are discarded and survive.

| Year | F | SSB(mt) | R(1000) | D(1000) | D(klb) | L(1000) | L(klb) | Sum L(klb) |
|------|------|---------|---------|---------|--------|---------|--------|------------|
| 2010 | 0.35 | 16.88 | 282 | 65 | 345 | 0 | 0 | 0 |
| 2011 | 0.35 | 20.64 | 286 | 84 | 384 | 0 | 0 | 0 |
| 2012 | 0.35 | 23.4 | 320 | 101 | 458 | 0 | 0 | 0 |
| 2013 | 0.35 | 26.26 | 342 | 112 | 504 | 0 | 0 | 0 |
| 2014 | 0.35 | 29.3 | 361 | 121 | 557 | 0 | 0 | 0 |
| 2015 | 0.35 | 32.53 | 380 | 130 | 610 | 0 | 0 | 0 |
| 2016 | 0.35 | 35.95 | 398 | 138 | 661 | 0 | 0 | 0 |
| 2017 | 0.35 | 39.58 | 414 | 146 | 712 | 0 | 0 | 0 |
| 2018 | 0.35 | 43.43 | 430 | 153 | 762 | 0 | 0 | 0 |
| 2019 | 0.35 | 47.42 | 444 | 160 | 812 | 0 | 0 | 0 |

Table 8a. Projection results (expected values) with $F=F_{msy}$, extended from assessment model configuration with component weights as in the AW report, but headboat index weight increased to $\omega = 0.25$. F is fishing mortality rate (per yr), SSB is mid-year spawning stock (mt), R is recruits (1000 age-1 fish), D is discard mortalities (1000 fish or 1000 lb whole weight), L is landings (1000 fish or 1000 lb whole weight), and sum L is cumulative landings.

| Year | F | SSB(mt) | R(1000) | D(1000) | D(klb) | L(1000) | L(klb) | Sum L(klb) |
|------|-------|---------|---------|---------|--------|---------|--------|------------|
| 2010 | 0.331 | 19.77 | 305 | 66 | 351 | 0 | 0 | 0 |
| 2011 | 0.196 | 24.23 | 314 | 31 | 53 | 31 | 358 | 358 |
| 2012 | 0.196 | 27.28 | 349 | 38 | 73 | 43 | 432 | 790 |
| 2013 | 0.196 | 30.68 | 370 | 42 | 82 | 50 | 490 | 1280 |
| 2014 | 0.196 | 34.4 | 390 | 45 | 88 | 57 | 555 | 1836 |
| 2015 | 0.196 | 38.45 | 409 | 47 | 92 | 62 | 618 | 2454 |
| 2016 | 0.196 | 42.81 | 427 | 50 | 97 | 68 | 680 | 3133 |
| 2017 | 0.196 | 47.48 | 445 | 52 | 102 | 73 | 741 | 3875 |
| 2018 | 0.196 | 52.46 | 461 | 54 | 106 | 78 | 803 | 4678 |
| 2019 | 0.196 | 57.61 | 476 | 56 | 110 | 83 | 865 | 5544 |

Table 8b. Projection results (expected values) with $F=F_{30}$, extended from assessment model configuration with component weights as in the AW report, but headboat index weight increased to $\omega = 0.25$. F is fishing mortality rate (per yr), SSB is mid-year spawning stock (mt), R is recruits (1000 age-1 fish), D is discard mortalities (1000 fish or 1000 lb whole weight), L is landings (1000 fish or 1000 lb whole weight), and sum L is cumulative landings.

| Year | F | SSB(mt) | R(1000) | D(1000) | D(klb) | L(1000) | L(klb) | Sum L(klb) |
|------|-------|---------|---------|---------|--------|---------|--------|------------|
| 2010 | 0.331 | 19.77 | 305 | 66 | 351 | 0 | 0 | 0 |
| 2011 | 0.192 | 24.23 | 314 | 30 | 52 | 31 | 351 | 351 |
| 2012 | 0.192 | 27.34 | 349 | 38 | 72 | 42 | 425 | 775 |
| 2013 | 0.192 | 30.8 | 370 | 41 | 80 | 49 | 482 | 1258 |
| 2014 | 0.192 | 34.59 | 390 | 44 | 86 | 56 | 547 | 1805 |
| 2015 | 0.192 | 38.72 | 410 | 47 | 91 | 62 | 610 | 2415 |
| 2016 | 0.192 | 43.17 | 428 | 49 | 96 | 67 | 671 | 3086 |
| 2017 | 0.192 | 47.95 | 446 | 51 | 100 | 72 | 733 | 3819 |
| 2018 | 0.192 | 53.05 | 462 | 53 | 104 | 77 | 795 | 4615 |
| 2019 | 0.192 | 58.33 | 477 | 55 | 108 | 82 | 857 | 5472 |

Table 8c. Projection results (expected values) with $F=0.98 \times F_{30}$, extended from assessment model configuration with component weights as in the AW report, but headboat index weight increased to $\omega = 0.25$. F is fishing mortality rate (per yr), SSB is mid-year spawning stock (mt), R is recruits (1000 age-1 fish), D is discard mortalities (1000 fish or 1000 lb whole weight), L is landings (1000 fish or 1000 lb whole weight), and sum L is cumulative landings.

| Year | F | SSB(mt) | R(1000) | D(1000) | D(klb) | L(1000) | L(klb) | Sum L(klb) |
|------|-------|---------|---------|---------|--------|---------|--------|------------|
| 2010 | 0.331 | 19.77 | 305 | 66 | 351 | 0 | 0 | 0 |
| 2011 | 0.188 | 24.23 | 314 | 30 | 51 | 30 | 344 | 344 |
| 2012 | 0.188 | 27.4 | 349 | 37 | 71 | 41 | 417 | 761 |
| 2013 | 0.188 | 30.91 | 370 | 41 | 79 | 48 | 475 | 1236 |
| 2014 | 0.188 | 34.77 | 391 | 43 | 85 | 55 | 539 | 1775 |
| 2015 | 0.188 | 38.98 | 411 | 46 | 90 | 61 | 602 | 2377 |
| 2016 | 0.188 | 43.52 | 430 | 48 | 94 | 66 | 663 | 3040 |
| 2017 | 0.188 | 48.41 | 447 | 50 | 99 | 71 | 725 | 3765 |
| 2018 | 0.188 | 53.62 | 464 | 52 | 103 | 76 | 787 | 4552 |
| 2019 | 0.188 | 59.03 | 479 | 54 | 107 | 81 | 849 | 5402 |

Table 8d. Projection results (expected values) under continued moratorium, extended from assessment model configuration with component weights as in the AW report, including headboat index weight of $\omega = 0.25$. F is fishing mortality rate (per yr), SSB is mid-year spawning stock (mt), R is recruits (1000 age-1 fish), D is discard mortalities (1000 fish or 1000 lb whole weight), L is landings (1000 fish or 1000 lb whole weight), and sum L is cumulative landings. In these projections, the F applied corresponds to $F=0.9 \times F_{\text{current}}$ ($F_{\text{current}} = 0.58$) but decreased to reflect potential landings that are discarded and survive.

| Year | F | SSB(mt) | R(1000) | D(1000) | D(klb) | L(1000) | L(klb) | Sum L(klb) |
|------|-------|---------|---------|---------|--------|---------|--------|------------|
| 2010 | 0.331 | 19.77 | 305 | 66 | 351 | 0 | 0 | 0 |
| 2011 | 0.331 | 24.23 | 314 | 85 | 393 | 0 | 0 | 0 |
| 2012 | 0.331 | 27.64 | 349 | 105 | 479 | 0 | 0 | 0 |
| 2013 | 0.331 | 31.11 | 372 | 116 | 531 | 0 | 0 | 0 |
| 2014 | 0.331 | 34.76 | 392 | 126 | 586 | 0 | 0 | 0 |
| 2015 | 0.331 | 38.6 | 411 | 134 | 640 | 0 | 0 | 0 |
| 2016 | 0.331 | 42.64 | 428 | 142 | 692 | 0 | 0 | 0 |
| 2017 | 0.331 | 46.91 | 444 | 149 | 743 | 0 | 0 | 0 |
| 2018 | 0.331 | 51.43 | 459 | 156 | 794 | 0 | 0 | 0 |
| 2019 | 0.331 | 56.09 | 473 | 163 | 845 | 0 | 0 | 0 |

Table 9a. Projection results (expected values) with $F=F_{msy}$, extended from assessment model configuration with component weights as in the AW report, but headboat index weight increased to $\omega = 0.30$. F is fishing mortality rate (per yr), SSB is mid-year spawning stock (mt), R is recruits (1000 age-1 fish), D is discard mortalities (1000 fish or 1000 lb whole weight), L is landings (1000 fish or 1000 lb whole weight), and sum L is cumulative landings.

| Year | F | SSB(mt) | R(1000) | D(1000) | D(klb) | L(1000) | L(klb) | Sum L(klb) |
|------|-------|---------|---------|---------|--------|---------|--------|------------|
| 2010 | 0.32 | 22.67 | 325 | 65 | 346 | 0 | 0 | 0 |
| 2011 | 0.206 | 27.74 | 338 | 34 | 57 | 32 | 377 | 377 |
| 2012 | 0.206 | 31.18 | 373 | 42 | 79 | 47 | 477 | 854 |
| 2013 | 0.206 | 34.94 | 393 | 46 | 88 | 53 | 539 | 1393 |
| 2014 | 0.206 | 38.98 | 413 | 49 | 94 | 60 | 603 | 1996 |
| 2015 | 0.206 | 43.32 | 431 | 51 | 99 | 66 | 664 | 2660 |
| 2016 | 0.206 | 47.96 | 448 | 53 | 103 | 71 | 725 | 3385 |
| 2017 | 0.206 | 52.91 | 464 | 55 | 108 | 76 | 787 | 4171 |
| 2018 | 0.206 | 58.14 | 478 | 57 | 112 | 80 | 849 | 5020 |
| 2019 | 0.206 | 63.53 | 492 | 59 | 115 | 85 | 912 | 5932 |

Table 9b. Projection results (expected values) with $F=F_{30}$, extended from assessment model configuration with component weights as in the AW report, but headboat index weight increased to $\omega = 0.30$. F is fishing mortality rate (per yr), SSB is mid-year spawning stock (mt), R is recruits (1000 age-1 fish), D is discard mortalities (1000 fish or 1000 lb whole weight), L is landings (1000 fish or 1000 lb whole weight), and sum L is cumulative landings.

| Year | F | SSB(mt) | R(1000) | D(1000) | D(klb) | L(1000) | L(klb) | Sum L(klb) |
|------|-------|---------|---------|---------|--------|---------|--------|------------|
| 2010 | 0.32 | 22.67 | 325 | 65 | 346 | 0 | 0 | 0 |
| 2011 | 0.204 | 27.74 | 338 | 33 | 57 | 32 | 372 | 372 |
| 2012 | 0.204 | 31.22 | 373 | 41 | 79 | 46 | 472 | 844 |
| 2013 | 0.204 | 35.02 | 394 | 45 | 87 | 53 | 534 | 1378 |
| 2014 | 0.204 | 39.1 | 413 | 48 | 93 | 60 | 597 | 1975 |
| 2015 | 0.204 | 43.5 | 431 | 50 | 98 | 65 | 658 | 2633 |
| 2016 | 0.204 | 48.2 | 448 | 53 | 102 | 70 | 719 | 3353 |
| 2017 | 0.204 | 53.22 | 464 | 55 | 107 | 75 | 781 | 4134 |
| 2018 | 0.204 | 58.53 | 479 | 57 | 110 | 80 | 844 | 4977 |
| 2019 | 0.204 | 64 | 493 | 58 | 114 | 85 | 907 | 5884 |

Table 9c. Projection results (expected values) with $F=0.98 \times F_{30}$, extended from assessment model configuration with component weights as in the AW report, but headboat index weight increased to $\omega = 0.30$. F is fishing mortality rate (per yr), SSB is mid-year spawning stock (mt), R is recruits (1000 age-1 fish), D is discard mortalities (1000 fish or 1000 lb whole weight), L is landings (1000 fish or 1000 lb whole weight), and sum L is cumulative landings.

| Year | F | SSB(mt) | R(1000) | D(1000) | D(klb) | L(1000) | L(klb) | Sum L(klb) |
|------|-------|---------|---------|---------|--------|---------|--------|------------|
| 2010 | 0.32 | 22.67 | 325 | 65 | 346 | 0 | 0 | 0 |
| 2011 | 0.199 | 27.74 | 338 | 33 | 56 | 31 | 365 | 365 |
| 2012 | 0.199 | 31.29 | 373 | 41 | 77 | 45 | 464 | 829 |
| 2013 | 0.199 | 35.14 | 394 | 44 | 86 | 52 | 525 | 1354 |
| 2014 | 0.199 | 39.3 | 414 | 47 | 92 | 59 | 589 | 1942 |
| 2015 | 0.199 | 43.79 | 432 | 50 | 96 | 64 | 649 | 2592 |
| 2016 | 0.199 | 48.58 | 449 | 52 | 101 | 69 | 710 | 3302 |
| 2017 | 0.199 | 53.72 | 466 | 54 | 105 | 74 | 772 | 4074 |
| 2018 | 0.199 | 59.15 | 481 | 56 | 109 | 79 | 835 | 4909 |
| 2019 | 0.199 | 64.76 | 495 | 58 | 112 | 84 | 898 | 5807 |

Table 9d. Projection results (expected values) under continued moratorium, extended from assessment model configuration with component weights as in the AW report, including headboat index weight of $\omega = 0.30$. F is fishing mortality rate (per yr), SSB is mid-year spawning stock (mt), R is recruits (1000 age-1 fish), D is discard mortalities (1000 fish or 1000 lb whole weight), L is landings (1000 fish or 1000 lb whole weight), and sum L is cumulative landings. In these projections, the F applied corresponds to $F=0.9 \times F_{\text{current}}$ ($F_{\text{current}} = 0.57$) but decreased to reflect potential landings that are discarded and survive.

| Year | F | SSB(mt) | R(1000) | D(1000) | D(klb) | L(1000) | L(klb) | Sum L(klb) |
|------|------|---------|---------|---------|--------|---------|--------|------------|
| 2010 | 0.32 | 22.67 | 325 | 65 | 346 | 0 | 0 | 0 |
| 2011 | 0.32 | 27.74 | 338 | 87 | 395 | 0 | 0 | 0 |
| 2012 | 0.32 | 31.72 | 373 | 109 | 500 | 0 | 0 | 0 |
| 2013 | 0.32 | 35.72 | 396 | 120 | 555 | 0 | 0 | 0 |
| 2014 | 0.32 | 39.88 | 416 | 129 | 611 | 0 | 0 | 0 |
| 2015 | 0.32 | 44.24 | 434 | 137 | 663 | 0 | 0 | 0 |
| 2016 | 0.32 | 48.8 | 451 | 145 | 715 | 0 | 0 | 0 |
| 2017 | 0.32 | 53.61 | 466 | 152 | 766 | 0 | 0 | 0 |
| 2018 | 0.32 | 58.67 | 480 | 158 | 817 | 0 | 0 | 0 |
| 2019 | 0.32 | 63.87 | 494 | 164 | 868 | 0 | 0 | 0 |