

Review of the NPFMC approach for setting ABC and OFL levels

Amendment 56 to the GOA Groundfish FMP, approved by the Council in June 1998, defines ABC and OFL for the GOA groundfish fisheries. The definitions are shown below, where the fishing mortality rate is denoted F , stock biomass (or spawning stock biomass, as appropriate) is denoted B , and the F and B levels corresponding to MSY are denoted F_{MSY} and B_{MSY} respectively. The conditions for determining the fishing mortality rate under the amended FMP is shown in Box 1 below.

Acceptable Biological Catch is a preliminary description of the acceptable harvest (or range of harvests) for a given stock or stock complex. Its derivation focuses on the status and dynamics of the stock, environmental conditions, other ecological factors, and prevailing technological characteristics of the fishery. The fishing mortality rate used to calculate ABC is capped as described under “overfishing” below.

Overfishing is defined as any amount of fishing in excess of a prescribed maximum allowable rate. This maximum allowable rate is prescribed through a set of six tiers which are listed below in descending order of preference, corresponding to descending order of information availability. The SSC will have final authority for determining whether a given item of information is reliable for the purpose of this definition, and may use either objective or subjective criteria in making such determinations. For tier (1), a pdf refers to a probability density function. For tiers (1-2), if a reliable pdf of B_{MSY} is available, the preferred point estimate of B_{MSY} is the geometric mean of its pdf. For tiers (1-5), if a reliable pdf of B is available, the preferred point estimate is the geometric mean of its pdf. For tiers (1-3), the coefficient α is set at a default value of 0.05, with the understanding that the SSC may establish a different value for a specific stock or stock complex as merited by the best available scientific information. For tiers (2-4), a designation of the form “ $F_{X\%}$ ” refers to the F associated with an equilibrium level of spawning per recruit (SPR) equal to $X\%$ of the equilibrium level of spawning per recruit in the absence of any fishing. If reliable information sufficient to characterize the entire maturity schedule of a species is not available, the SSC may choose to view SPR calculations based on a knife-edge maturity assumption as reliable. For tier (3), the term $B_{40\%}$ refers to the long-term average biomass that would be expected under average recruitment and $F=F_{40\%}$.

In summary, Figure 1 shows a schematic of how harvest rates are adjusted depending on the current stock size. In this illustration, the MSST represents the minimum stock-size threshold, which for pollock occurs at 50% of the “target” biomass of $B_{40\%}$. Note that due to ecosystem concerns and Steller sea lion prey, the fishing mortalities will be specified to be zero should the stock drop below the MSST. This is further illustrated in a simulation showing catch and fishing mortality for a simple age-structured model result for Bogoslof pollock (Fig. 2). In practice, these harvest control rules have properties that enhance the likelihood that the stock will increase to above the target SSB when it drops below. At the other extremes (when stocks are at high levels), over-arching OY principles (e.g., bycatch constraints, 2 million t cap on all groundfish quotas) play a large role in preventing over-capitalization and thereby relieves some economic pressures when quotas are required to be reduced.



Box 1. Conditions for fishing mortality rates under the current (2004) Tier system used under amendment 56 to the FMP for North Pacific groundfish fisheries.

| | |
|-------------|---|
| Tier | <p>1) Information available: <i>Reliable point estimates of B and B_{MSY} and reliable pdf of F_{MSY}.</i></p> <p>1a) Stock status: $B/B_{MSY} > 1$ $F_{OFL} = \mu_A$, the arithmetic mean of the pdf $F_{ABC} \leq \mu_H$, the harmonic mean of the pdf</p> <p>1b) Stock status: $\alpha < B/B_{MSY} \leq 1$ $F_{OFL} = \mu_A \times (B/B_{MSY} - \alpha)/(1 - \alpha)$ $F_{ABC} \leq \mu_H \times (B/B_{MSY} - \alpha)/(1 - \alpha)$</p> <p>1c) Stock status: $B/B_{MSY} \leq \alpha$ $F_{OFL} = 0$ $F_{ABC} = 0$</p> <p>2) Information available: <i>Reliable point estimates of B, B_{MSY}, F_{MSY}, F_{35%}, and F_{40%}.</i></p> <p>2a) Stock status: $B/B_{MSY} > 1$ $F_{OFL} = F_{MSY}$ $F_{ABC} \leq F_{MSY} \times (F_{40\%}/F_{35\%})$</p> <p>2b) Stock status: $\alpha < B/B_{MSY} \leq 1$ $F_{OFL} = F_{MSY} \times (B/B_{MSY} - \alpha)/(1 - \alpha)$ $F_{ABC} \leq F_{MSY} \times (F_{40\%}/F_{35\%}) \times (B/B_{MSY} - \alpha)/(1 - \alpha)$</p> <p>2c) Stock status: $B/B_{MSY} \leq \alpha$ $F_{OFL} = 0$ $F_{ABC} = 0$</p> <p>3) Information available: <i>Reliable point estimates of B, B_{40%}, F_{35%}, and F_{40%}.</i></p> <p>3a) Stock status: $B/B_{40\%} > 1$ $F_{OFL} = F_{35\%}$ $F_{ABC} \leq F_{40\%}$</p> <p>3b) Stock status: $\alpha < B/B_{40\%} \leq 1$ $F_{OFL} = F_{35\%} \times (B/B_{40\%} - \alpha)/(1 - \alpha)$ $F_{ABC} \leq F_{40\%} \times (B/B_{40\%} - \alpha)/(1 - \alpha)$</p> <p>3c) Stock status: $B/B_{40\%} \leq \alpha$ $F_{OFL} = 0$ $F_{ABC} = 0$</p> <p>4) Information available: <i>Reliable point estimates of B, F_{35%}, and F_{40%}.</i> $F_{OFL} = F_{35\%}$ $F_{ABC} \leq F_{40\%}$</p> <p>5) Information available: <i>Reliable point estimates of B and natural mortality rate M.</i> $F_{OFL} = M$ $F_{ABC} \leq 0.75 \times M$</p> <p>6) Information available: <i>Reliable catch history from 1978 through 1995.</i> $OFL =$ the average catch from 1978 through 1995, unless an alternative value is established by the SSC on the basis of the best available scientific information $ABC \leq 0.75 \times OFL$</p> |
|-------------|---|

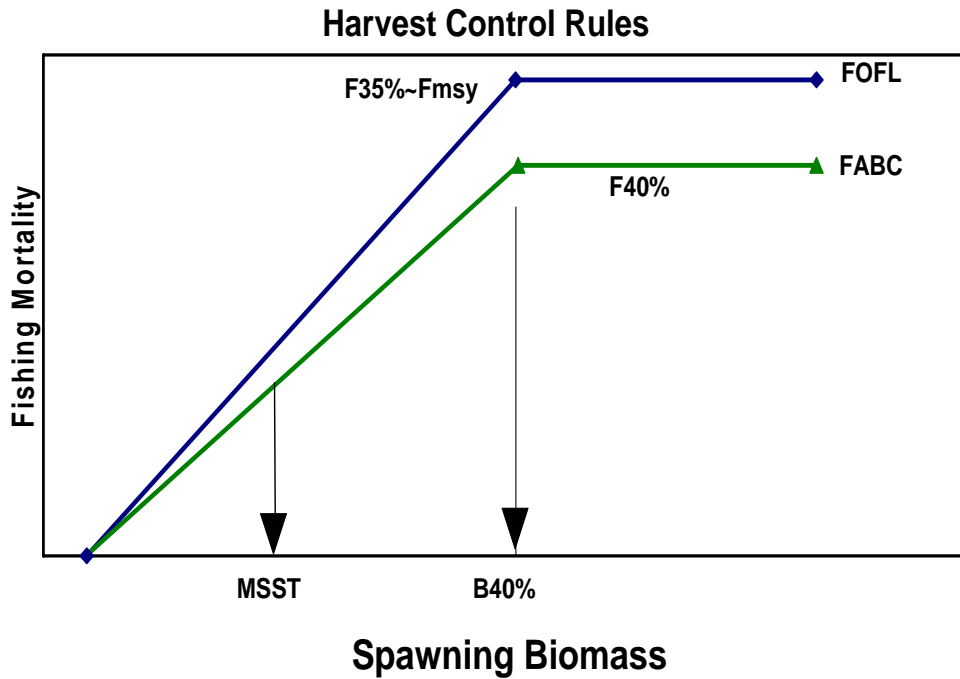


Figure 1. General schematic of harvest control rule used for N. Pacific groundfish stocks.

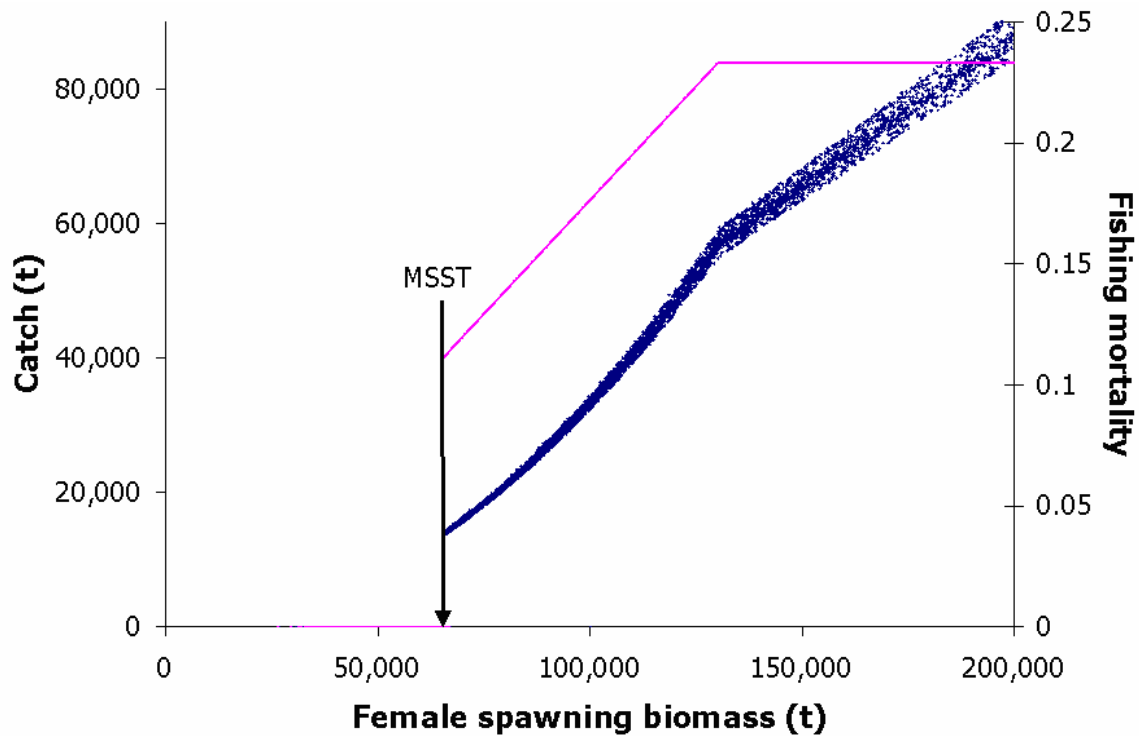


Figure 2. Simulation results showing harvest control rule in effect for Bogoslof pollock where the $B_{40\%}$ level is about 130,000 t of female spawning biomass and the MSST is about 65,000 t. The catch is shown by the band of points and the fishing mortalities by the straight line segments.

ABC, OFL, and TAC levels set for 2005 and 2006

In order to follow the administrative procedures act and follow the guidelines for environmental assessments of actions (including fishing), the NPFMC and NMFS now require estimates of ABC and OFLs (and preliminary TACs) projected for two years. The result of these projections are shown in the table below as published in the Federal Register.

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TABLE 1.—2005 AND 2006 OVERFISHING LEVEL (OFL), ACCEPTABLE BIOLOGICAL CATCH (ABC), TOTAL ALLOWABLE CATCH (TAC), INITIAL TAC (ITAC), AND CDQ RESERVE ALLOCATION OF GROUND FISH IN THE BSAI.¹
[Amounts are in metric tons]

| Species | Area | 2005 | | | | | 2006 | | | | |
|-----------------------------|-----------------|-----------|-----------|-----------|-------------------|------------------|-----------|-----------|-----------|-------------------|------------------|
| | | OFL | ABC | TAC | ITAC ² | CDQ ³ | OFL | ABC | TAC | ITAC ² | CDQ ³ |
| Pollock ⁴ | BS ² | 2,100,000 | 1,960,000 | 1,478,500 | 1,330,650 | 147,850 | 1,944,000 | 1,617,000 | 1,487,756 | 1,338,980 | 148,776 |
| | AI ² | 39,100 | 29,400 | 19,000 | 17,100 | 1,900 | 39,100 | 29,400 | 19,000 | 17,100 | 1,900 |
| | Bogoflot | 39,600 | 2,570 | 10 | 10 | | 39,600 | 2,570 | 10 | 10 | |
| Pacific cod | BSAI | 265,000 | 206,000 | 206,000 | 175,100 | 15,450 | 228,000 | 195,000 | 195,000 | 165,750 | 14,625 |
| Sablefish ⁵ | BS | 2,950 | 2,440 | 2,440 | 2,013 | 336 | 2,690 | 2,310 | 2,310 | 982 | 87 |
| | AI | 3,170 | 2,620 | 2,620 | 2,129 | 442 | 2,880 | 2,480 | 2,480 | 527 | 47 |
| Atka mackerel | BSAI | 147,000 | 124,000 | 63,000 | 53,550 | 4,725 | 127,000 | 107,000 | 63,000 | 53,550 | 4,725 |
| | EAI/BS | | 24,550 | 7,500 | 6,375 | 563 | | 21,190 | 7,500 | 6,375 | 563 |
| | CAI | | 52,830 | 35,500 | 30,175 | 2,663 | | 45,580 | 35,500 | 30,175 | 2,663 |
| | WAI | | 46,620 | 20,000 | 17,000 | 1,500 | | 40,230 | 20,000 | 17,000 | 1,500 |
| Yellowfin sole | BSAI | 148,000 | 124,000 | 90,686 | 77,083 | 6,801 | 133,000 | 114,000 | 90,000 | 76,500 | 6,750 |
| Rock sole | BSAI | 157,000 | 132,000 | 41,500 | 35,275 | 3,113 | 145,000 | 122,000 | 42,000 | 35,700 | 3,150 |
| Greenland turbot | BSAI | 19,200 | 3,930 | 3,500 | 2,975 | 263 | 11,100 | 3,600 | 3,500 | 2,975 | 263 |
| | BS | | 2,720 | 2,700 | 2,295 | 203 | | 2,500 | 2,500 | 2,125 | 188 |
| | AI | | 1,210 | 800 | 680 | 60 | | 1,100 | 1,000 | 850 | 75 |
| Arrowtooth flounder | BSAI | 132,000 | 108,000 | 12,000 | 10,200 | 900 | 103,000 | 88,400 | 12,000 | 10,200 | 900 |
| Flathead sole | BSAI | 70,200 | 58,500 | 19,500 | 16,575 | 1,463 | 56,100 | 48,400 | 20,000 | 17,000 | 1,500 |
| Other flatfish ⁶ | BSAI | 28,500 | 21,400 | 3,500 | 2,975 | 263 | 28,500 | 21,400 | 3,000 | 2,550 | 225 |
| Alaska plaice | BSAI | 237,000 | 189,000 | 8,000 | 6,800 | 600 | 115,000 | 109,000 | 10,000 | 8,500 | 750 |
| Pacific ocean perch | BSAI | 17,300 | 14,600 | 12,600 | 10,710 | 945 | 17,408 | 14,600 | 12,600 | 10,710 | 945 |
| | BS | | 2,920 | 1,400 | 1,190 | 105 | | 2,920 | 1,400 | 1,190 | 105 |
| | EAI | | 3,210 | 3,080 | 2,618 | 231 | | 3,210 | 3,080 | 2,618 | 231 |
| | CAI | | 3,165 | 3,035 | 2,580 | 228 | | 3,165 | 3,035 | 2,580 | 228 |
| | WAI | | 5,305 | 5,085 | 4,322 | 381 | | 5,305 | 5,085 | 4,322 | 381 |
| Northern rockfish | BSAI | 9,810 | 8,260 | 5,000 | 4,250 | 375 | 9,480 | 8,040 | 5,000 | 4,250 | 375 |
| Shortraker rockfish | BSAI | 794 | 596 | 596 | 507 | 45 | 794 | 596 | 596 | 507 | 45 |
| Roughye rockfish | BSAI | 298 | 223 | 223 | 190 | 17 | 298 | 223 | 223 | 190 | 17 |
| Other rockfish ⁷ | BSAI | 1,870 | 1,400 | 1,050 | 893 | 79 | 1,870 | 1,400 | 1,050 | 893 | 79 |
| | BS | | 810 | 460 | 391 | 35 | | 810 | 460 | 391 | 35 |
| | AI | | 590 | 590 | 502 | 44 | | 590 | 590 | 502 | 44 |
| Squid | BSAI | 2,620 | 1,970 | 1,275 | 1,084 | | 2,620 | 1,970 | 1,275 | 1,084 | |
| Other species ⁸ | BSAI | 87,920 | 53,860 | 29,000 | 24,650 | 2,175 | 87,920 | 57,870 | 29,200 | 24,820 | 2,190 |
| Total | | 3,509,332 | 3,044,769 | 2,000,000 | 1,774,719 | 186,608 | 3,093,360 | 2,547,259 | 2,000,000 | 1,772,778 | 187,350 |

¹These amounts apply to the entire BSAI management area unless otherwise specified. With the exception of pollock, and for the purpose of these harvest specifications, the Bering Sea (BS) subarea includes the Bogoflot District.
²Except for pollock and the portion of the sablefish TAC allocated to hook-and-line and pot gear, 15 percent of each TAC is put into a reserve. The ITAC for each species is the remainder of the TAC after the subtraction of these reserves.
³Except for pollock, squid and the hook-and-line or pot gear allocation of sablefish, one half of the amount of the TACs placed in reserve, or 7.5 percent of the TACs, is designated as a CDQ reserve for use by CDQ participants (see §§679.20(b)(1)(iii) and 679.31).
⁴Under §679.20(a)(5)(i)(A)(1), the annual Bering Sea pollock TAC after subtraction for the CDQ directed fishing allowance—10 percent and the ICA—3.35 percent, is further allocated by sector for a directed pollock fishery as follows: inshore—50 percent; catcher/processor—40 percent; and motherships—10 percent. Under regulations that would be effective with the final rule implementing Amendment 82, the annual AI pollock TAC, after first subtracting for the CDQ directed fishing allowance—10 percent and second the ICA—2,000 mt., would be allocated to the Aleut Corporation for a directed pollock fishery.
⁵Twenty percent of the sablefish TAC allocated to hook-and-line gear or pot gear and 7.5 percent of the sablefish TAC allocated to trawl gear is reserved for use by CDQ participants (see §679.20(b)(1)(iii)).
⁶“Other flatfish” includes all flatfish species, except for halibut (a prohibited species), flathead sole, Greenland turbot, rock sole, yellowfin sole, arrowtooth flounder and Alaska plaice.
⁷“Other rockfish” includes all *Sebastes* and *Sebastolobus* species except for Pacific ocean perch, northern, shortraker, and roughye rockfish.
⁸“Other species” includes sculpins, sharks, skates and octopus. Forage fish, as defined at §679.2, are not included in the “other species” category.