

recognizes the need to achieve reductions more quickly in these fisheries, which have historically experienced higher halibut mortality rates. Lowering limits in the second and third years of the program is intended to provide time for outlier vessels to adjust their bycatch avoidance practices to these more restrictive standards. The rate reductions will have the effect of making scaled mortality reductions on outlier vessels, as well as reducing halibut mortality overall in these fisheries.

The cooperative reviewed the different target fishery standards prior to the 2021 season. That review revealed that some vessels continued to be challenged by those rate standards, despite all vessels meeting the annual rate standards. This review suggested that the thresholds would continue to achieve the incentives for minimizing halibut bycatch that were sought when developing the program.

Rate standards based on the fleet mean 2012-2014 rate with a decreasing multiplier.

Species	2012-2014 Base Rate (kg/mt)	Year	Multiplier	Rate Standard (kg/mt)
Yellowfin sole	5.8	2016	2	11.7
		2017	1.75	10.2
		2018	1.5	8.7
Rock sole	7.2	2016	2	14.3
		2017	1.75	12.6
		2018	1.5	10.8
Flathead sole/ Arrowtooth flounder	11.7	2016	1.8	21
		2017	1.65	19.2
		2018	1.5	17.5

The test is applied by comparing a vessel’s halibut rate in a target fishery to the applicable annual standard at the end of the year. A vessel’s rate will be based on its target catches in Amendment 80 and CDQ fisheries combined. Including CDQ catch will prevent vessels from attributing catch to one management program or the other based on the potential for a violation under the program. Vessels that exceed the applicable rate standard will be subject to a monetary penalty as described below.

A vessel that has unacceptably high bycatch with little groundfish target catch early in the season may attempt to fish its way out of a penalty under the program. To avoid the potential for discouraging such a vessel from exiting a fishery prior to catching a substantial amount of halibut, vessels that have minimal groundfish catch in a target will be excluded from the program. Thresholds for the targets are 1,000 mt in yellowfin sole, 1,000 in rock sole, and 500 mt in arrowtooth/flathead. These catch thresholds should be adequate to ensure that a vessel has an incentive to leave a fishery prior to using substantial mortality if it cannot achieve acceptable bycatch rates.

Vessels that do not pass the annual outlier test for a given target species will be subject to a monetary penalty. Fines are on a target basis, so a vessel will be subject to a penalty in each target in which it fails to meet the applicable standard. Fines for each target range from a minimum of \$50,000 to a maximum of \$100,000 based on the vessel’s halibut rate and the amount of groundfish harvested. Having the penalty increase with groundfish harvests creates a disincentive for continuing harvests at the unacceptably high rate. Vessels that do not meet the annual standard will also be subject to additional scrutiny in the following year by being subject to quarterly monitoring.

Fourth Quarter Test

Among the concerns addressed by this plan is the historical rise halibut rates in the fourth quarter. The rise is likely attributable to several factors, including dispersion of target fish on the grounds, halibut abundance and distribution, and incentives for halibut avoidance. Under the fourth quarter monitoring plan, vessels must maintain halibut rates at or below a threshold level in the three flatfish targets include in the program. Although the large majority of groundfish catch and halibut bycatch in the fourth quarter is from the yellowfin sole target, full accountability for halibut bycatch is better achieved by a more comprehensive program that also includes the rock sole and arrowtooth flounder/flathead sole targets.

The rate standard is set at the fourth quarter 2012-2014 fleet average halibut rate in the aggregated flatfish targets. Recognizing that halibut rates have historically been highest in the fourth quarter, no multiplier is applied to this rate. This results in a rate standard of 12.1 kilograms of halibut per metric ton of groundfish harvest. By simply requiring all vessels to stay below the historical fleet average, the fleet's overall rate will be reduced from historical levels. Vessels that are above the test rate are considered outliers and are subject to a monetary penalty. Like the annual test, the fourth quarter test provides a vessel just beginning to fish in the fourth quarter that immediately realizes poor halibut rates with an opportunity to leave the fishery by exempting any vessel from the penalties that has minimal catch (defined as less than 750 mt). The program also recognizes that a vessel's quarterly halibut catch, in and of itself, could reach an unacceptable level, regardless of the amount of target catch of the vessel. To prevent a vessel from taking an excessive amount of halibut a 20 mt threshold will be applied, after which the penalty system will apply to the vessel, regardless of whether the 750 mt threshold is reached. This threshold creates an incentive for a vessel with unacceptably high halibut mortality to discontinuing fishing, regardless of how quickly it approaches the 750 mt catch threshold.

Vessels that do not meet the fourth quarter rate standard in the aggregated flatfish targets will be subject to fines. Fines range from a minimum of \$25,000 to a maximum of \$50,000 and are in addition to any annual fine assessed. Fines increase with both the halibut rate of the vessel and the amount of groundfish catch by the vessel. Increasing penalties with groundfish catch creates an incentive for a vessel to stop fishing if it is unable to improve its rates.

The cooperative's review of the standards prior to the 2021 season also suggested that the fourth quarter standard (12.1 kg halibut/mt of groundfish) continues to create the desired incentive for halibut mortality minimization.

Quarterly Outlier Test - Tier 2

The quarterly outlier test provides additional scrutiny of vessels that fail to meet an annual halibut rate standard. The additional scrutiny is intended to increase the incentive for non-performing vessels to meet acceptable rate standards in the subsequent year. A vessel is additionally subject to the quarterly monitoring test for any targets for which it failed the annual rate test the preceding year. All vessels (including those subject to quarterly monitoring) remain subject to both the annual monitoring and the fourth quarter monitoring.

The quarterly rate standard for the first three quarters will be the same as the annual rate standard applicable in that calendar year. For example, a vessel that is subject to quarterly monitoring in a target would be subject to quarterly monitoring in the target at the annual rate standard for that target for the first three quarters of the year. In the fourth quarter, vessels subject to quarterly monitoring will be required to meet the fourth quarter test rate that applies to all flatfish targets. Vessels under quarterly monitoring are subject to two penalties for failing to meet the fourth quarter rate, a halibut penalty under the quarterly plan (as described below) and a monetary penalty under the fourth quarter monitoring plan (as described above).

As with the other tests under the program, the quarterly rate standards are not applied to vessels that have not reached a threshold catch amount. For the first three quarters the catch threshold would be the same as the annual catch threshold in the applicable target fishery (i.e., 1,000 metric tons in the yellowfin sole and rock sole target fisheries and 500 metric tons in the arrowtooth flounder/flathead sole target fishery). In the fourth quarter, the threshold catch amount is 750 metric tons, which is the same threshold used in the fourth quarter test.

As in the fourth quarter test, the quarterly test recognizes that a vessel's quarterly halibut catch, in and of itself, could reach an unacceptable level, regardless of the amount of target catch of the vessel. To prevent a vessel from taking an excessive amount of halibut, a 20 metric ton threshold will be applied in each quarter. If that threshold is exceeded the penalty system will apply to the vessel, regardless of whether the applicable catch threshold is reached.

A vessel that fails to meet the quarterly rate standard will be subject to a halibut penalty equal to the additional halibut that the vessel used as a result of exceeding the target rate. This amount is calculated as the difference between the vessel's actual halibut use and the use that the vessel would have achieved had it met the applicable rate standard. In other words, the vessel's halibut use in the quarter minus the vessel's groundfish catch in that quarter times the applicable rate standard.

Retrospective analysis of the halibut avoidance plan

In developing the program, the sector undertook a retrospective analysis of the potential effect of the program to assess its potential effect. This analysis applied the various standards to prior years' fishing to ensure that behavior modification would be driven by the plan.

Effects of the annual outlier test

The table below shows the fines that would have been applied under the annual standard had the program been in place from 2008 to 2015. Fines in the fisheries follow no particular pattern when compared to overall fleet performance. In a few cases, more fines are imposed in years of relatively high mortality rates; however, in some years of low mortality rates, both the number of vessels subject to fines and the amount of fines are large. Such a result suggests that the test will be useful for deterring outlier vessels, rather than just fining vessels when halibut mortality rates are relatively high overall. The table shows that fines would have which averaged over \$430,000 annually under the rate standards applied in 2017. The highest fines in a given year would have exceeded \$600,000.

Projected annual fines by target under the annual outlier test applying the 2017 standards (2008-2015).

Target	Year	Number of vessels	Number of vessels fined	Fine amounts (\$)
Yellowfin sole	Average	19	3	176,875
	Maximum	21	4	320,000
Rocksole	Average	19	2	165,000
	Maximum	21	5	370,000
Arrowtooth flounder /flathead sole	Average	17	1	88,125
	Maximum	18	5	395,000
Total	Average	55	6	430,000
	Maximum	59	9	610,000

Note: total vessel counts includes double counting of vessels in multiple targets.

Effects of the fourth quarter test

The table below shows a retrospective analysis of the fourth quarter test from 2008 through 2015. The test shows that fines would have averaged almost \$150,000 annually, with 5 vessels failing to meet the rate standard on average. At most 10 vessels would have been fined for exceeding the standard and over \$320,000 would have been paid by substandard vessels in one year.

Projected annual fines under the fourth quarter test (2008-2015).

	Number of vessels	Number of fined vessels	Fine amounts (\$)
average	15	5	142,500
maximum	18	10	320,000

Performance in the 2021 season

In considering fleet performance, it is important to keep in mind that the objective of the avoidance plan is not to collect fines, but to change incentives in a manner that induces all vessels to meet the rate standards. In other words, success should be measured not in the amount of money paid in fines, but rather by the absence of fines. The retrospective analysis provides a reasonable baseline for assessing performance. Fewer fines than those suggested by the retrospective analysis suggest that changes in halibut mortality rates intended to arise from the program have occurred.

In 2021, performance of vessels under the plan continued to be substantially better than historical performance, with no vessels failing to achieve the standard set by the plan. Prior to 2018, all vessels achieved mortality rates low enough to avoid penalty. In the 2018 season, one vessel fished at halibut rates that led to a penalty under the annual standard in one target fishery, the rock sole fishery. That vessel was penalized at the lowest level, \$50,000, as a result of its low amount of groundfish catch in the target and its bycatch rate exceeding the standard by a small amount. The vessel's rate would not have incurred a penalty under the 2017 standard of 12.6 kg halibut per mt of groundfish. Since 2018, all vessels achieved mortality rates low enough to avoid penalties. Despite this success, several vessels were challenged to meet the standard, periodically having catch mortality rates in excess of the standard.

In 2021, annual participation in the yellowfin sole target was similar to prior years with 19 vessels participating. The rock sole fishery saw a decline in participation from 19 vessels to 16 vessels in 2021. Seventeen vessels met the minimum groundfish catch threshold in the yellowfin fishery, while only 6 vessels met the minimum groundfish catch threshold in the rock sole fishery needed for the standard to apply. Fifteen vessels participated in the arrowtooth flounder and flathead sole target fisheries, down from the historical period, when an average of 17 vessels fished these targets. Only 7 vessels reached the minimum groundfish threshold in the arrowtooth and flathead targets. All of these vessels achieved halibut rates below the applicable rate standard.

The single vessel that failed to meet the rock sole annual standard in 2018 was the only vessel subject to quarterly monitoring to date. No vessel was under quarterly monitoring in 2021.

Annual outlier test results for 2021.

	Number of vessels in the fishery	Number of vessels meeting the minimum groundfish threshold	Number of those vessels meeting the halibut rate standard
Target			
Yellowfin sole	19	17	17
Rock sole	16	6	6
Arrowtooth and flathead (combined)	15	7	7

No vessels have exceeded the fourth quarter rates since the program’s inception. In the fourth quarter of 2021, 12 vessels fished in the flatfish targets included in the program. As of Nov 10th, 10 vessels have met the minimum groundfish catch threshold, with all vessels meeting the halibut rate standard. Performance in 2021 continued to be substantially better than historical performance, as prior to implementation of the program, 5 vessels on average exceeded the 4th quarter rate standard each year.

Fourth quarter outlier results for 2021.

Number of vessels in yellowfin, rock sole, and flathead/arrowtooth targets	12
Number of vessels meeting the minimum groundfish threshold	10
Number of vessels meeting the 4th quarter standard	10

Historically, some vessels in the Amendment 80 sector were outliers, maintaining halibut bycatch rates higher than the rest of the fleet. The program’s rate standards and their accompanying penalties are intended to induce those vessels to reduce rates to acceptable levels given the historical fleet average. Since the program was implemented in 2016, the occurrence of a single penalty (in comparison to the historical fishing) demonstrates the success of the program in bringing outlier vessels closer to the fleet average. At the same time, the penalization of a vessel in 2018 and the challenges faced by the fleet at times under the program have shown that the standards are constraining, requiring vessels to change behavior to achieve the target rate.

The halibut avoidance plan and its associated standards and penalties have become an integral part of the in-season management of halibut in the Amendment 80 sector. Starting the first week of fishing, each company receives a weekly report showing the performance of each of its vessels relative to the applicable standards, and vessels may access their performance relative to rate standards at any time through Seastate. Vessels and vessel managers continuously monitor their performance against these standards, where they may need to balance current and expected future halibut rates against their groundfish catch within each applicable target.

Typically, at least two and at times as many as five vessels have exceeded the acceptable rate during the year, creating a situation where they are forced to decide whether to leave the fishery altogether (if they have not already reached the applicable minimum groundfish threshold) or continue fishing with even higher attention to bycatch rates to bring their rate down below the standard. This process of real-time reporting, monitoring halibut avoidance performance, and active decision-making have greatly contributed to the sector’s ability in maintaining operations despite reductions in halibut limits and usage by the sector.

Deck sorting

Since 2009, the cooperative has worked closely with NMFS through Exempted Fishing Permits (EFPs) to explore options that allow vessels to return halibut to the sea quickly from the deck to reduce mortality while accurately accounting for halibut released from the deck and its viability. In 2020, NMFS implemented a regulatory change allowing for deck sorting as a standard part of vessel operations. In developing and implementing these regulations, NMFS worked to ensure both reasonable oversight and monitoring and implementation that allows industry to achieve similar success to that under the EFPs. When deck sorting, the codend is pulled forward of the aft live tank hatches to allow space for sorting and is gradually emptied onto the deck. Crewmembers carefully remove halibut while moving the other fish into the tanks. The halibut are carefully brought to a station/table where the observer on duty is positioned. The observer's table typically leads to a chute used to channel halibut off the vessel after counting and sampling. All observer tables must be pre-approved by NMFS prior to deck sorting and video monitoring is used in all locations where crew activities involving sorting and handling of halibut occur. Each vessel must also have an approved Deck Safety Plan to take part in deck sorting.

In 2021, deck sorting continued to be used, with all cooperative vessels participating in deck sorting and much of the cooperative's catch deck sorted to reduce halibut mortality. AKSC data has shown a lower fraction of hauls were deck sorted in 2021 relative to 2019 and 2020. Captains have said that a primary reason for less deck sorting was low halibut encounter rates, particularly for hauls made during daylight hours. Deck sorting at times of good catch rates delays fishing. As deck sorting consumes additional time each day more fishing activity is pushed into nighttime hours, which can result in increased overall halibut catch and usage. Vessels also had difficulty finding and retaining crews due to the COVID-19 pandemic reducing crew levels on boats. Deck sorting requires additional labor on deck from "combi" crew (who split time between deck and factory work). The smaller crew sizes exacerbated delays in restarting fishing and factories further reducing vessels' daylight fishing time. Vessels experiencing these challenges at times used other tools, such as excluders, instead of deck sorting. Excluder usage was mainly limited to times when halibut encountered were sufficiently larger than target species to make excluder usage effective.

Feedback from NMFS personnel at the Alaska Regional office, Fisheries Monitoring and Analysis (FMA), and Office of Enforcement was generally positive regarding how deck sorting went during the second year of the regulatory program. FMA also noted that they appreciated the fleet's focusing deck sorting on situations where mortality savings were meaningful given all the work deck sorting creates for observers. We are therefore optimistic that the regulatory program for deck sorting will continue to generate benefits commensurate with its potential and its achievements to date.

Overview of the Sector's Halibut Avoidance Performance

Halibut avoidance performance is subject to a variety of factors in addition to use of halibut avoidance measures. Fishing conditions (including the presence or absence of halibut intermingled with groundfish stocks) often vary across time in unpredictable ways. As a result, halibut bycatch fluctuates within and across years. The Amendment 80 sector's halibut PSC performance improved considerably from 2014 through 2017. In 2018 and 2019, the cooperative's halibut bycatch pre-mortality and halibut mortality both increased in comparison to 2017; however, in 2020 and 2021, the sector saw significant drops in halibut catches.

In 2018 and 2019, captains in the fleet increasingly found halibut distributed throughout the fishing grounds. Higher water temperatures likely resulted in less concentration of flatfish and led vessels to fish further north. In addition, halibut were typically of similar size to target flatfish limiting the effectiveness of excluders. As a result, pre-mortality bycatch climbed in 2018 and again in 2019. Despite these challenges, in 2018 and 2019 deck sorting allowed the sector to reduce halibut mortality to approximately 1,350 mt and 1,450 mt, respectively – levels never achieved prior to 2016. In 2020 and 2021, the sector

found greater concentrations of target flatfish with fewer halibut intermixed. Although the cause is uncertain, lower water temperatures, particularly early in the year, likely contributed to this effect. In addition, in both years catches of flatfish have declined due to market pressures arising from COVID-19 restrictions and the effects of tariffs. Year-end mortality for both of these years is expected to be similar to the lowest ever achieved by the sector (see Table 1).

The table shows wide variation in halibut encounters in recent years, with 2016, 2017, 2020, and 2021 having the lowest encounter rates the sector has ever seen. Yet, in 2018 and 2019 halibut encounters and catch rates are the highest since implementation of Amendment 80. In those years, the sector was only able to keep halibut mortality low because of the reduced mortality from deck sorting. In those years, despite high pre-mortality bycatch, the sector has been able to reduce mortality rates (i.e., halibut mortality per mt of groundfish) to levels unattainable prior to 2016. Without deck sorting, the fleet would likely have reached its halibut mortality limit midyear.

Table 1: Amendment 80 halibut mortality in the Bering Sea and Aleutian Islands (2008-2021).

Year	Total # of Vessels	Total Groundfish	Halibut Bycatch Pre-mortality	Halibut Bycatch Rate Pre-mortality (kg/mt gf)	Halibut Mortality	Bycatch Rate Halibut Mort. (kg/mt gf)
2008	21	326,994	2,471	7.6	1,925	5.9
2009	21	314,700	2,591	8.2	2,092	6.6
2010	20	336,280	2,633	7.8	2,284	6.8
2011	20	324,681	2,277	7.0	1,811	5.6
2012	19	326,930	2,469	7.6	1,945	5.9
2013	18	334,521	2,678	8.0	2,168	6.5
2014	18	334,978	2,668	8.0	2,179	6.5
2015	18	306,422	1,719	5.6	1,633	5.3
2016	19	316,676	1,965	6.2	1,412	4.5
2017	19	294,034	1,974	6.7	1,169	4.0
2018	19	310,806	2,550	8.2	1,343	4.3
2019	20	309,868	3,045	9.8	1,458	4.7
2020	19	311,781	2,030	6.5	1,098	3.5
2021	19	267,236	1,568	5.9	954	3.6

2021 data updated 11.10.2021

Although the halibut PSC limit of the sector applies across all halibut management areas in the Bering Sea and Aleutian Islands, the sector monitors its halibut usage in the three Bering Sea and Aleutian Island halibut management areas to ensure that its bycatch does not disproportionately affect any one area. In the most recent years (including 2021), the sector's halibut usage in all three areas has been near historical lows. In the two most recent years, halibut usage has been affected by the effects of COVID-19 measures and tariffs on the ability of the sector to prosecute its fisheries and sell its catches (Table 2).

Table 2: Amendment 80 sector halibut mortality in Bering Sea and Aleutian Islands halibut management areas (2008-2021).

Year	4A	4B	4CDE
2008	332	88	1,505
2009	498	163	1,432
2010	295	242	1,748
2011	264	225	1,321
2012	298	261	1,385
2013	295	206	1,667
2014	151	168	1,860
2015	127	145	1,361
2016	83	115	1,203
2017	100	119	950
2018	86	105	1,153
2019	84	70	1,303
2020	76	62	960
2021	72	88	794

2021 data updated 11.10.2021

Halibut mortality reductions continue to come at significant expense to the sector. Most vessels have purchased several excluders, as effectiveness of different types and specifications vary with conditions and target species. Some vessels have carried a third observer to reduce factory shutdowns during deck sorting. Fuel expenses rise as vessels move away from areas with unacceptably high bycatch rates. Revenues are also reduced by most halibut avoidance measures as catches of groundfish are low in comparison to the years immediately following implementation of Amendment 80. Excluder use reduces target catches – in some cases by as much as 40%. When beginning to fish a new area, vessels often do small test tows to determine whether halibut catch rates are low enough to allow fishing. Fishing time increases and catches drop with these added small tows and movement away from high bycatch areas. Deck sorting also slows operations as crew suspend other work to sort halibut.

Conclusion

Amendment 80 sector members rely on multiple tools to reduce halibut PSC. Effectiveness of different tools varies with fishing conditions. As a result, the sector's members change halibut PSC reduction methods with changes in conditions. At times, safety concerns may prevent the use of deck sorting in stormy weather, requiring vessels to rely more heavily on excluders. Despite these challenges, the sector has achieved substantial reductions in halibut PSC through its persistent efforts.

Amendment 80 Sector's Halibut Bycatch Rules

(Adopted by all sector members in 2015)

In order reduce bycatch to allow for a substantial increase in the directed halibut fishery catch limit in Area 4CDE from the IPHC staff's preliminary blue line advice, the members of the Alaska Seafood Cooperative (AKSC) agree to the following terms:

Notice of entry to/exit from the BSAI fisheries - Each vessel will notify both Seastate and the other fishery participants on entry to or exit from the Bering Sea and Aleutian Islands fisheries to facilitate communication.

On grounds communication among captains – Captains will communicate on the grounds concerning halibut bycatch rates. On grounds communication provides the most up to date and complete information concerning halibut avoidance – includes discussions of:

- 1) prevailing bycatch rates and changes in those rates,
- 2) catch rates of halibut (particularly in the 4CDE accounting area),
- 3) effectiveness of deck sorting in the different target fisheries under various conditions and bycatch levels,
- 4) effectiveness of excluders in the different target fisheries under various conditions and bycatch levels, and
- 5) any factor that may be relevant to bycatch rates and bycatch rates, including the effects on halibut rates and halibut rates of:
 - a. time of day
 - b. fishing depth
 - c. water temperature
 - d. areas of halibut concentrations
 - e. excluder performance (including type and mesh size)
 - f. effects of any gear modifications.

Test tows – When appropriate, vessels will use smaller test tows to ensure that halibut rate is acceptable prior to fishing an area.

Attention to Haul Composition –Wheelhouse personnel will give increased attention to haul composition by watching the bag dump and assessing the halibut bycatch rate and halibut O26 bycatch rate and to increase communication with deck crew concerning halibut bycatch (and halibut O26 bycatch) trends.

Excluder Use – The use of excluders is encouraged. Since excluders may have limited benefits (and sometimes increase bycatch) in the high volume, low bycatch periods, vessels are also encouraged to share information concerning the effectiveness of excluders when fishing different areas and under different conditions.

Seastate Reporting – Seastate is commissioned to develop bycatch charts on a regular basis that display the halibut bycatch rates in the fisheries. These charts will show halibut bycatch by target fishery.

Deck sorting - Vessels are strongly encouraged to use deck sorting to reduce mortality of halibut (particularly in the 4CDE accounting area).

Night Towing – Night towing is discouraged in fisheries with historically higher night halibut bycatch rates. Cooperative members are directed to give extra attention to halibut bycatch rates (and 4CDE halibut bycatch) if fishing at night. If a vessel cannot achieve night fishing bycatch rates that are measurably similar to day fishing bycatch rates, the vessel is strongly encouraged to end night fishing.

Rate Standard — As fishing progresses during the season, cooperative members will consider whether any halibut rate standards may be beneficial for achieving halibut bycatch reductions. Rate standards could be applied at the target fishery level to compel certain avoidance measures if appropriate rate levels and monitoring requirements and effective response measures can be identified.

Weekly meetings – Cooperative members agree to meet weekly as needed to discuss overall Bering Sea halibut PSC performance and 4CDE accounting area halibut bycatch performance. Meetings will include discussions of:

- 1) Prevailing halibut bycatch rates and performance (and particularly 4CDE accounting area rates and performance).
- 2) Success of the various bycatch avoidance strategies identified in this agreement and the effects of any other strategy or factor on bycatch avoidance and rates
- 3) Development of additional measures to reduce bycatch, including whether sufficient information exists to develop any new or additional bycatch avoidance requirements or practices to supplement those identified in this agreement
- 4) Possible performance standards and responses required for those vessels not meeting the standards.