

alter fishing location and time to achieve high yield for target species and low halibut bycatch rates. Small test tows are used to assess catch conditions for bycatch and target species when moving to a new area.

Principal to these halibut avoidance measures was active communication among captains on the grounds. The effectiveness of the various halibut avoidance measures changes with fishery conditions. On the grounds communications keep captains well-informed on successful PSC avoidance strategies allowing them to cope with continuously changing fishing conditions and effectiveness of the various halibut avoidance tools. The sector supplements these on the grounds communications with weekly meetings of company representatives and vessels captains, as needed. At the meetings, a review of weekly halibut performance reports leads into a discussion of the conditions on the grounds and the effectiveness of halibut avoidance measures (including discussions of halibut mortality rates, target species, excluder effectiveness, halibut movement, fishing depths, and bottom temperatures in the areas being fished by sector members.

The cooperative, along with member company managers, monitors individual vessel halibut performance through Seastate. Monitoring is conducted through regular checks on cooperative, as well as company and vessel, performance.

All sector members have experimented with a variety of excluders designs. Choice of excluder typically depends on the specific vessel's operating characteristics and conditions in the fishery (such as size of target catch and size of halibut encountered). Vessels often modify existing designs to improve effectiveness, increasing the exclusion of halibut and decreasing loss of target catch.

Halibut Avoidance Plan

To further the incentive for halibut avoidance in the sector, its members developed and agreed to performance standards that define maximum halibut rates (kilograms of halibut mortality per metric ton of groundfish) in target fisheries that are prone to halibut bycatch. The plan is intended to ensure that no vessels are outliers with unacceptably high halibut bycatch rates using both annual and quarterly performance standards. The plan also establishes a maximum halibut rate standard for the fourth quarter when halibut rates typical rise to their highest levels. Vessels that fail to stay below the rate standards are penalized, with penalties increasing with both the vessel's halibut rate and groundfish harvest. This section provides a brief description of the plan, as well as the performance of the sector's vessels under the plan in its first four years.

Description of the plan

The sector's halibut avoidance plan is comprised of three tests. Two of the tests provide incentives for maintaining acceptable halibut avoidance on an annual basis. The third test provides incentives for maintaining halibut avoidance techniques into the fourth quarter, when halibut rates historically have risen.

- Annual Outlier Test - Tier 1: Individual vessels are required to meet annual halibut rate standards for three species/species group target fisheries – yellowfin sole, rock sole, and flathead sole/arrowtooth flounder. The annual standards become more stringent over time to incorporate learning and increased ability of vessels to achieve halibut avoidance goals. Vessels that fail to meet the applicable rate standard are subject to monetary penalties.
- Fourth Quarter Test: To curtail the potential for halibut rates to increase in the fourth quarter, all vessels are subject to a fourth quarter rate standard. Vessels that fail to meet the rate standard are subject to monetary penalties.

- Quarterly Outlier Test - Tier 2: Any vessel that does not meet the Tier 1 annual standard in a target fishery will be subject to quarterly monitoring the following year, in addition to the annual monitoring and fourth quarter monitoring that apply to all vessels. Vessels that fail to meet the applicable Tier 2 standard in any quarter would be subject to halibut forfeitures.

Annual Outlier Test - Tier 1

The Annual Outlier Test (Tier 1) requires each vessel to meet halibut rate standards annually in three different target fisheries. The outlier test is similar to the Vessel Incentive Program (VIP), which was abandoned by the Council due, in part, to NMFS enforceability concerns. The inter-cooperative agreement provides a structure for internally implementing and enforcing these standards without regulation.

The yellowfin sole, rock sole, flathead sole, and arrowtooth flounder targets accounted for over 80 percent of the halibut mortality of the sector in every year since 2008; therefore, these target fisheries provide the greatest opportunity for halibut mortality savings. Maintaining halibut mortality rates in these targets at low, yet practicable, levels allows the fleet to minimize halibut use to the extent practicable.

The plan sets rate standards in three different target fisheries based on historical performance. Yellowfin sole and rock sole are each monitored independently because these fisheries occur in different areas at different times of year. Arrowtooth flounder and flathead sole occur in similar fishing locations, times, and conditions and are therefore aggregated as a target under the plan.

Under the program, rates are based on the 2012-2014 average halibut rates for each of the targets. These years represent the most recent three-year average leading up to adoption of this program, and are most representative of conditions at the time of the adoption of the program. Similar to the VIP, the average halibut rate for each target species is multiplied by a “multiplier” to establish the standard recognizing that a portion of the fleet exceeds the average by definition. The VIP multiplier of 2.0 was used as the starting point for yellowfin sole and rock sole targets in 2016. To bring outlier vessels closer to the fleet average, the multiplier in these target fisheries was reduced to 1.75 in 2017 and 1.5 in 2018. The arrowtooth flounder/flathead sole combined target is subject to a 1.8 multiplier in 2016, which was reduced to 1.65 in 2017, and 1.5 in 2018 and thereafter. The more stringent starting point for these targets 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 2019 season. That review revealed that some vessels continued to be challenged by those thresholds, include one vessel that failed to meet one of the annual thresholds. 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.

To avoid the potential for discouraging a vessel with unacceptably high halibut rates from exiting a fishery, 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 included 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 the historical 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 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 at the end of the 2018 season also suggested that the fourth quarter standard (12.1 kg halibut/mt of groundfish) would continue to create the desired incentive for halibut mortality minimization, if continued into the 2019 season.

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) will be 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 (through December 1, 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 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 2019 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.

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 relatively 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. In 2019, 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.

Annual participation in the yellowfin sole and rock sole targets was similar to participation levels in the historical period, with 20 vessels participating in both of those fisheries. All vessels met the minimum groundfish catch threshold in the yellowfin fishery and fourteen vessels met the minimum groundfish catch threshold in the rocksole fishery needed for the standard to apply. Only 16 vessels participated in the arrowtooth flounder and flathead sole target fisheries, down from an average of 17 vessels in the historical period, with 11 vessels reaching the minimum groundfish thresholds. All vessels that reached the minimum groundfish threshold in the arrowtooth/flathead target achieved halibut rates below the applicable 2019 rate standard.

The single vessel that failed to meet the rock sole annual standard in 2018 is the only vessel subject to quarterly monitoring to date. That vessel met the requirements of the quarterly test each quarter of 2019, thereby was subject to no penalty under quarterly monitoring.

Annual outlier test results for 2019 (updated through November 25, 2019).

Target	Number of vessels in the fishery	Number of vessels meeting the minimum groundfish threshold	Number of those vessels meeting the halibut rate standard
Yellowfin sole	20	20	20
Rock sole	20	14	14
Arrowtooth and flathead (combined)	16	11	11

No vessels have exceeded the fourth quarter rate in any of the first four years of the program. In the fourth quarter in 2019, 17 vessels fished in the flatfish targets included in the program. Of those vessels, 11 met the minimum groundfish catch threshold, with all vessels meeting the halibut rate standard. Performance in 2019 was substantially better than historical performance, as prior to implementation of the program, 5 vessels on average exceeded the rate standard annually.

Fourth quarter outlier results for 2019 (updated through November 25, 2019).

Number of vessels in yellowfin, rock sole, and flathead/arrowtooth targets	17
Number of vessels meeting the minimum groundfish threshold	11
Number of vessels meeting the 4th quarter standard	11

Historically, some vessels in the Amendment 80 sector were outliers, maintaining halibut bycatch rates substantially 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 level given the historical fleet average. In the first four years of the program, the occurrence of a single penalty and a second possible penalty this year (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 in this year’s fishery show that the program is 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 the inseason management of halibut in the Amendment 80 sector. Each company receives a weekly report showing the performance of each of its vessels relative to the applicable standards. These reports further monitoring of halibut avoidance efforts and have contributed to the sector’s in maintaining operations despite the recent reduction 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. Under these EFPs, 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 slid or carried 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.

The 2019 EFP had the highest level of participation to date. All 22 vessels eligible to participate in the EFP participated this year. A large majority of all catch of eligible vessels was taken in the EFP. Vessels also increasingly used deck sorting in the Atka mackerel and Pacific ocean perch fisheries. Over 284,000 MT of groundfish were harvested in the 2019 EFP, as of November 26, 2019. The average halibut DMR in the 2019 EFP was approximately 49%, compared to the default DMR of 78% or 79% assigned to trawl CP vessels this year, depending on regulatory area.

Future Halibut Savings Using Deck Sorting

In the coming 2020 season, deck sorting will be under regulation, rather than under an EFP. The Alaska Seafood Cooperative believes that achievement of savings of a magnitude similar to that under the EFP is possible under the regulatory program but could be jeopardized by future decisions in implementation of the final rule. To this end, we have two strong suggestions.

First, we strongly recommend continuing the practice of regular meetings between NMFS staff and cooperative staff to discuss issues arising "in-season" under the program. The success of deck sorting EFPs in achieving halibut savings are largely a result of the collaborative efforts of the cooperative, NMFS Fishery Monitoring and Analysis, NMFS Sustainable Fisheries, and NMFS Enforcement. Regular meetings between representatives of each of these groups throughout the EFP allowed us to identify and address problems and unanticipated situations before those problems became unworkable or undermined success of the program. Deck sorting requires substantial communications and interactions between crews and observers, as crews attempt to safely remove halibut from the deck. The implementation of a rule governing this complex system introduces several potential pitfalls. From an industry standpoint, the potential for inadvertent violations is particularly problematic. Captains, mates, deck crew, and processors may participate in deck sorting; and vessel leadership work hard to ensure that all participating crew are aware of and abide by all rules. Continuing the collaborative approach used to implement the EFPs should help alleviate these concerns, prevent inadvertent violation of program protocols, and increase the success of the program in achieving halibut savings. We strongly urge all parties (including the Council) to support continuation of these meetings indefinitely. We would appreciate the Council's endorsement recommending regular in-season communication between NMFS and involved industry continue in some useful for during the regulatory program.

Our second recommendation is that the Council oversee any modifications of the administrative aspects of the program using a process that allows the affected industry, public, and the Council to provide meaningful input into those changes. The final rule recently adopted by NMFS provides substantial flexibility to the agency to modify administration of deck sorting, including limits on sorting time, sampling protocols, and observer practices. This flexibility allows for NMFS to avoid cumbersome rulemaking, effectively streamlining modifications to administrative requirements. Given the years of experience administering deck sorting under the EFPs, the need for using this flexibility should be very minimal. NMFS's final rule states that it intends to bring these matters before the Fishery Monitoring and Analysis Committee when it meets in September. While that committee has done yeomen's work on issues affecting partial observer coverage and electronic monitoring for sectors without full time coverage and one or two full-time observers, very few of its members have been involved in discussions of deck sorting protocols. We appreciate the Council's stated intent to annually review any proposed changes to oversight, observer requirements, or accounting protocols. This oversight should ensure that the program achieves its intended purpose without imposing unreasonable monitoring burdens.

While the cooperative understands NMFS preference for this flexible approach to administration of deck sorting, we are concerned with the risks to mortality savings. Given the potential costs in halibut mortality, experimentation with changes that could increase mortality should be avoided.¹ Halibut mortality savings will depend not only on the efforts of the cooperative to reduce that mortality but also in large measure on NMFS willingness to prioritize reducing halibut mortality when considering possible revision of procedures for data collection, observer and sampling protocols, and other administrative aspects of the program.

In summary, we remain convinced that the regulatory program for deck sorting can continue to generate benefits commensurate with its potential and its achievements under the EFP; however, we are also convinced that achieving those benefits depends on both careful oversight of program implementation and thoughtful development of any modifications to the program. Modifications to administrative aspects without regard to their effect on halibut savings will reduce benefits of the program.

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, the cooperative's halibut bycatch pre-mortality and halibut mortality both increased in comparison to 2017. This trend continued into 2019.

Since 2017, captains in the fleet have increasingly found halibut distributed throughout the fishing grounds. Higher water temperatures have 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, deck sorting allowed the sector to reduce halibut mortality to approximately 1,450 mt to date. Based on the current number of vessels fishing, year end mortality should remain below 1,500 mt, a level never achieved prior to 2015 (see Table 1).

The 2018 and 2019 results show that deck sorting is critical to achieving halibut bycatch mortality in the sector. Despite relatively 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. Deck sorting continues to be the most effective tool for reducing halibut mortality. Maintaining a workable deck sorting program under regulation is critical to the continued success of the fleet in reducing halibut mortality.

¹ An example of a potentially costly change is sorting time limits. NMFS currently proposes continuing to allow vessels 35 minutes to sort halibut on deck. Collaborative discussions between the cooperative, NMFS Sustainable Fisheries, and NMFS Fishery Monitoring and Analysis based on several years of experience under the EFP concluded that the 35-minute limit reasonably balances potential halibut savings with the added observer burdens arising under deck sorting. Notwithstanding this collaborative agreement, NMFS rule allows modification of this time limit, including the adoption of vessel specific time limits, without rule making. Some NMFS staff have continued to suggest experimenting with vessel specific limits in the future, in part, as a means of reducing observer workloads. The increase in mortality from limiting the time for deck sorting varies greatly with target fishery and fishing conditions. Vessels will change timing, location, and fishery targets annually with changes in TACs, markets, and fishing conditions (including halibut catch rates). These changes will prevent development of coherent vessel specific limits that are unlikely to reduce halibut mortality. We are very concerned that attempts to tailor time limits to specific vessels will prevent achievement of halibut saving by limiting the flexibility of vessels to use deck sorting as conditions change.

Amendment 80 halibut mortality in the Bering Sea and Aleutian Islands (2008-2019) as of December 1, 2019.

Year	Number 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	308,922	3,031	9.8	1,450	4.7

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, the sector’s halibut usage in all three areas has been near historical lows. In 2018, halibut mortality was at its second lowest level since implementation of Amendment 80 in all three areas. In 2019, halibut mortality reached historical lows in Areas 4A and 4B, but rose over 100 mt in Area 4CDE (Table 2).

Amendment 80 sector halibut mortality in Bering Sea and Aleutian Islands halibut management areas (2008-2019) as of December 1, 2019.

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	1,295

Halibut mortality reductions have 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 relatively 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%. Fishing time and catches drop with movement away from high bycatch areas and deck time being devoted to sorting halibut.

Evidence of the challenges facing the sector, its efforts to avoid halibut, and the added costs incurred are shown by catch and tow data (see Table 3). In 2019, catcher per vessel has averaged 75 percent of the 2008-2016 average. In addition, the number of tows of 10 mt or less per vessel increased by more almost 70 percent in comparison to vessel average from 2008 to 2016. The decline in catch per vessel and the number of relatively small tows reflect fishing conditions and efforts of vessels to reduce halibut mortality.

Table 3. Catch and tows per vessel (2008-2019) as of December 1, 2019.

Year	Catch per vessel	Tows per vessel	Tow of less than 10 mt per vessel
2008	14,030	702	186
2009	14,864	654	138
2010	17,521	724	117
2011	16,177	654	110
2012	16,113	639	79
2013	18,039	721	107
2014	17,125	736	97
2015	15,924	790	147
2016	15,899	853	165
2017	17,019	765	145
2018	12,657	838	190
2019	11,974	830	216

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.