Alaska Seafood Cooperative Halibut Bycatch Performance
Report to the North Pacific Fishery Management Council
December 2020

Under the Magnuson Stevens Fishery Conservation and Management Act, the North Pacific Fishery Management Council (the Council) and National Marine Fisheries Service (NMFS) are directed to manage fisheries to reduce bycatch and bycatch mortality to the extent practicable. To this end, the Council and NMFS, along with members of the industry, including participants in the Amendment 80 sector (i.e., multispecies groundfish catcher processors), have taken a series of initiatives to reduce halibut bycatch and its mortality in the trawl fisheries in the North Pacific. This report summarizes the most significant recent initiatives and their results.

Background

The halibut PSC reduction adopted by the Council in 2015 was the culmination of a series of regulatory and self-imposed measures reducing halibut use by the Amendment 80 sector. The Council intended Amendment 80 to provide the sector with the ability to increase retention by ending the race for fish. The action has exceeded expectations, with groundfish retention increasing from levels slightly above 50 percent prior to Amendment 80 to over 90 percent currently. Although the Council's primary focus of the Amendment 80 was groundfish retention, the action also included a reduction of halibut available to the sector. The initial limit, together with a 150 mt reduction over the course of the first four years of the program, represented a 12 percent reduction from historical use.

In June of 2014, the Alaska Seafood Cooperative (AKSC) undertook a second, this time voluntary, reduction in halibut PSC usage. At that meeting, at the request of IPHC Commissioners, the Council passed a motion asking all BSAI sectors to "undertake voluntary efforts to reduce halibut mortalities in the BSAI resulting from PSC use by 10% from the current 5-year average levels through the 2014-2015 fishing season." As understood by the Council and industry at the time, the reduction would stem a decline in catch limits in directed halibut fishery in the Area 4CDE management area, which includes the Pribilof Islands and Western Alaska. In response, the cooperative established protocols and targets for reducing its halibut usage in the second half of 2014 (July to December). The cooperative successfully reduced its halibut usage for the year and achieved the Council's reduction goal. Despite achieving the goal, the halibut catch limit in Area 4CDE declined, in part, due to concentration of bycatch in Area 4CDE and the size composition of that bycatch, factors that were not considered by industry, the IPHC Commissioners, or the Council when requesting the bycatch reduction from the different Bering Sea and Aleutian Islands fleets.

At its December 2014 meeting, the Council moved to address the decline in the Area 4CDE halibut fishery catch limit, requesting NMFS to take emergency action to reduce halibut PSC available to all sectors by 33 percent, the reduction needed to achieve a 1 net million pound catch limit in Area 4CDE. NMFS subsequently rejected the Council's request for emergency action.

To do its part to rectify the drop in the halibut catch limit in Area 4CDE, representatives of the AKSC attended the January 2014 meeting of the IPHC, providing a presentation to the Commission describing halibut bycatch reduction measures employed by the cooperative, the PSC reduction needed to allow for a 1 million net pound catch limit in Area 4CDE, and identifying the cooperative's proportional share of that reduction based on historical PSC usage. Based in part on the cooperative's presentation and the presentations of other halibut PSC users, the IPHC established a 1.285 million net pound catch limit for

Area 4CDE. The cooperative achieved the target reduction, reducing its bycatch by almost 4 percent below its target.

This outcome reflects the sector's willingness to respond to halibut management issues quickly and effectively when the Council and NMFS were unable to. In the two months between the IPHC's interim and annual meeting, halibut PSC users developed plans to respond to the needs of directed halibut users based on the preliminary analysis that the IPHC uses to set the directed fishery catch limits. The IPHC relied on these cooperative measures to achieve the Council's halibut directed fishery management goal of a 1 million net pound fishery, while the detrimental effects of halibut PSC reductions on the cooperative were mitigated by its targeted action. These directed actions are informative, as the Council considers the effects of various halibut PSC reductions, as well as the necessity and practicability of various future actions.

In June of 2015, the Council took further action to reduce halibut available to Amendment 80 participants, reducing PSC available to cooperatives by 25 percent and reducing allocations to any limited access fishery by 40 percent. NMFS implemented this latest reduction in 2016. Since 2008, when the Amendment 80 sector began the process of regulatory and self-imposed halibut PSC reductions, the cooperative has developed a variety of tools to help achieve its halibut reduction goals. In addition, in direct response to the Council's request to adopt a halibut avoidance plan, the cooperative and the Alaska Groundfish Cooperative entered an inter-cooperative agreement for halibut avoidance as described below. These efforts have resulted in substantial halibut savings over the last four years allowing the IPHC to set substantially larger catch limits than might have been advisable had halibut usage remained at its historical level.

The Cooperative's Halibut Agreement

The cooperative's halibut agreement defines a means of ensuring sector-wide accountability for halibut avoidance. The agreement consists of three components:

- Best Practices – The plan defines best operational practices for halibut avoidance for the Amendment 80 sector. On the grounds, halibut avoidance practices are described, including: monitoring halibut bycatch; communication protocols; excluder use and development; and halibut avoidance through changing a variety of fishing parameters, including location, target, depth, tow speed, and other factors.
- Halibut Avoidance Plan – The plan defines performance standards to incentivize all vessels in the fleet to achieve acceptable levels of halibut use in the fisheries. The program is intended to ensure that all vessels maintain minimum halibut rates annually using both annual and quarterly performance standards with a specific component to assess performance in the fourth quarter, when halibut rates have historically increased to the highest levels for the year.
- Deck sorting – The sector has spent several years developing a deck sorting program, which allows vessels to deck sort halibut to return halibut to the water quickly, thereby reducing halibut mortality. In the coming year, deck sorting will be governed by a new regulatory program. NMFS developed the regulatory program after several years of experimenting under exempted fishing permits (EFPs).

Participation in the agreement is a condition of cooperative membership, with all member companies and their vessels legally bound to the terms of the agreement.

Best Practices

The sector utilizes a suite of bycatch tools to reduce halibut mortality, most of which are described in its rules of the road document, which is attached. This section provides a brief description of the sector's halibut avoidance efforts set out in that agreement.

Sector members minimize halibut usage through a variety of halibut avoidance measures, including choices of fishing location and time of day, excluders, and deck sorting. The sector's vessel operators 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 8o 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 2020 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.

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 prior to the 2020 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) 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 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 2020 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 2020, 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 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, and again in 2020, 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 2020, annual participation in the yellowfin sole and rock sole targets was similar to participation levels in the historical period, with 19 vessels participating in both of those fisheries. All vessels met the minimum groundfish catch threshold in the yellowfin fishery, while only ten vessels met the minimum groundfish catch threshold in the rock sole fishery needed for the standard to apply. Only 14 vessels participated in the arrowtooth flounder and flathead sole target fisheries, down from last year, when 16 participated, and the historical period, when an average of 17 vessels fished these targets. But 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 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 2020.

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	19	19	19
Rock sole	19	10	10
Arrowtooth and flathead (combined)	14	7	7

No vessels have exceeded the fourth quarter rate in any of the first four years of the program. In the fourth quarter in 2020, 15 vessels fished in the flatfish targets included in the program. Of those vessels, 13 met the minimum groundfish catch threshold, with all vessels meeting the halibut rate standard. Performance in 2020 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 2020.

Number of vessels in yellowfin, rock sole, and flathead/arrowtooth targets	15
Number of vessels meeting the minimum groundfish threshold	13
Number of vessels meeting the 4th quarter standard	13

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 5 years of the program, 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 the in-season 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. 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 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.

In 2020, deck sorting continued to be used extensively, with all cooperative vessels participating in deck sorting and a substantial majority of the cooperative's catch deck sorted to reduce halibut mortality. Yet, a decrease in the amount of halibut catch led many boats to reduce their use of deck sorting during periods when few halibut were encountered. Since deck sorting slows operations, the lower halibut encounter rates in 2020 allowed vessels to use deck sorting more selectively and avoided the production slowdowns that can occur in years like 2019 when halibut were seemingly everywhere member vessels could find economically viable flatfish fishing.

Feedback from NMFS personnel at the Alaska Regional office, Fisheries Monitoring and Analysis, and Office of Enforcement was generally positive regarding how deck sorting went during the first year of the regulatory program. We are therefore optimistic that the regulatory program for deck sorting will continue to generate benefits commensurate with its potential and its achievements under the EFP.

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, the sector saw a significant drop 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, the sector found greater concentrations of target flatfish with fewer halibut intermixed with those target flatfish. Although the cause is uncertain, lower water temperatures, particularly early in the year, likely contributed to this effect. Based on the current number of vessels fishing, year-end mortality should remain below 1,200 mt, a level similar to the lowest ever achieved by the sector (see Table 1).

The sector experienced wide variation in halibut encounters in recent years, with 2016, 2017, and 2020 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 relatively low because of the reduced mortality from deck sorting. In those years, 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.

Table 1: Amendment 80 halibut mortality (in mts) in the Bering Sea and Aleutian Islands (2008-2020).

Year	Total 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	309,868	3,045	9.8	1,458	4.7
2020	19	304,112	1,975	6.5	1,059	3.5
Note: 2020 data are through November 20.						

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 2020, the sector's halibut mortality in all three halibut management areas will likely remain near historical lows (Table 2).

Table 2: Amendment 80 sector halibut mortality (in mts) in Bering Sea and Aleutian Islands halibut management areas (2008-2020).

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	75	60	925
Note: 2020 data are through November 20.			

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 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%. 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 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.

Evidence of the annual variation in 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 2020, catch per vessel, tows per vessel, and tows less than 10 mt per vessel (a proxy for the number of test tows) were all comparable to their levels in 2016 (with catch at its highest level since 2014 and tows and tows less than 10 mt at their lowest levels since 2014). In 2019, the average vessel catch was less than in any year since 2008. 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. These fluctuations in catch per vessel and the number of relatively small tows reflect fishing conditions and efforts of vessels to reduce halibut mortality. These wide fluctuations demonstrate the variation and unpredictability of fishing conditions across years as conditions on the grounds change.

Table 3. Catch (in mts) and tows per vessel (2008-2020).

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	15,959	853	165
2017	15,188	765	145
2018	15,476	838	190
2019	14,298	833	216
2020	16,006	741	145

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.