

Review of Gulf of Alaska Groundfish Fishery Management Plan Amendment 101 to Allow Pot Longline Gear in the Sablefish IFQ Fishery

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Abstract: This document is a review of the sablefish pot fishery in the Gulf of Alaska (GOA) since the implementation of Amendment 101 in 2017. GOA Amendment 101 allowed for sablefish pot fishing in the GOA in response to increased sperm whale depredation in the hook-and-line (HAL) fishery. The Council's motion at final action included a statement that a review on the effects of allowing GOA Sablefish pot longline gear will be conducted three years after implementation. This review offers information based on the available 3-4 years of fishery data as well information gathered from speaking with fishery participants, managers, and stock assessment scientists.

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List of Acronyms and Abbreviations

Acronym or Abbreviation	Meaning
ABC	acceptable biological catch
ADF&G	Alaska Department of Fish and Game
AFSC	Alaska Fisheries Science Center
AIS	Automatic Identification System
AKFIN	Alaska Fisheries Information Network
AKRO	Alaska Regional Office (NMFS)
BSAI	Bering Sea and Aleutian Islands
CAS	Catch Accounting System
CEQ	Council on Environmental Quality
CFEC	Commercial Fisheries Entry Commission
CFR	Code of Federal Regulations
CGOA/CG	Central Gulf of Alaska
COAR	Commercial Operators Annual Report
Council	North Pacific Fishery Management Council
CP	catcher/processor
CPUE	Catch per unit effort
CV	catcher vessel
E.O.	Executive Order
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EIS	Environmental Impact Statement
EM	Electronic monitoring
ESA	Endangered Species Act
FIS	Fisheries Impact Statement
FMA	Fisheries Monitoring and Analysis
FMP	fishery management plan
FR	<i>Federal Register</i>
Ft	foot or feet
GOA	Gulf of Alaska
HAL	Hook and line
H&G	Head and Gut
ICA	Incidental catch allowance
IFQ	Individual Fishing Quota
IPHC	International Pacific Halibut Commission
LAPP	Limited access privilege program

Acronym or Abbreviation	Meaning
lb(s)	pound(s)
LLP	license limitation program
LOA	length overall
M	meter or meters
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MMPA	Marine Mammal Protection Act
MRA	Maximum retainable amount
mt	Metric ton
NEPA	National Environmental Policy Act
NMFS	National Marine Fishery Service
NOAA	National Oceanic and Atmospheric Administration
NPFMC	North Pacific Fishery Management Council
Observer Program	North Pacific Groundfish and Halibut Observer Program
ODDS	Observer Deploy and Declare System
OFL	Overfishing level
PSC	prohibited species catch
QS	Quota shares
RAM	Restricted Access Management
RFA	Regulatory Flexibility Act
RIR	Regulatory Impact Review
SAFE	Stock Assessment and Fishery Evaluation
SAR	stock assessment report
SE	Southeast District/subarea
Secretary	Secretary of Commerce
TAC	total allowable catch
U.S.	United States
USCG	United States Coast Guard
VMP	Vessel monitoring plan
VMS	vessel monitoring system
WGOA/WG	Western Gulf of Alaska
WYAK/WY	West Yakutat District

Table of Contents

<i>Executive Summary</i>	7
1 <i>Introduction and History of Action</i>	9
2 <i>Participation in the Fishery</i>	12
2.1 Vessels	12
2.2 Processors and ports of landing	17
2.3 Individual harvesters and crew	21
2.4 Effort	22
3 <i>Sablefish Harvest</i>	23
3.1 Amount and spatial distribution of harvest	23
3.2 Sablefish discards.....	28
4 <i>Incidental Catch in the Sablefish Pot Fishery</i>	29
4.1 Groundfish, halibut, and crab.....	29
4.2 Seabird and marine mammal interactions.....	33
5 <i>Fishery Revenues</i>	34
6 <i>Observer Program and Electronic Monitoring</i>	40
7 <i>Stock assessment considerations</i>	46
7.1 Whale depredation estimation	46
7.2 CPUE estimation	48
7.3 Size selectivity	50
8 <i>Vessel and gear characteristics</i>	52
9 <i>Management and Enforcement</i>	57
9.1 Pot tag requirement	57
9.1.1 Replacement tags	58
9.1.2 Annual administration	58
9.1.3 Cost recovery	59
9.1.4 NMFS recommendations	60
9.2 Automatic Identification System (AIS).....	60
10 <i>Topics of continued interest that could be informed by industry knowledge and public testimony</i>	62
11 <i>Preparers and Persons Consulted</i>	64
12 <i>References</i> 65	

List of Tables

Table 2-1	Number of vessels that harvested sablefish IFQ in the GOA, by gear type.....	12
Table 2-2	Vessels that harvested sablefish IFQ by GOA subarea and gear type.....	13
Table 2-3	Number of vessels in each length category by gear type and year	14
Table 2-4	Number of vessels by length and gear type in each area	15
Table 2-5	Catcher Vessels in the GOA Pot Sablefish IFQ fishery by Community of Vessel Historic Ownership Address, 2017-2019 (number of vessels).....	16
Table 2-6	Catcher Vessels in the GOA Sablefish IFQ Fishery by Community of Vessel Historic Ownership Address, 2014-2019 (number of vessels).....	17
Table 2-7	Shore-Based Processors and Floating Processors (SBPRs) Accepting GOA Sablefish IFQ Deliveries by Community of Operation, 2014-2019 (number of processors).....	18
Table 2-8	Shore-Based Processors and Floating Processors in Alaska Accepting GOA Sablefish IFQ Pot Deliveries by Community of Operation, 2017-2019 (number of processors).....	19
Table 2-9	Top Ports of Landing Ranked by % of GOA Sablefish Caught in Pots, 2020	20
Table 2-10	Average number of sablefish IFQ permit holders per vessel	21
Table 2-11	Average crew size by vessel length and gear type.....	21
Table 2-12	Number of trips by subarea and gear type.....	22
Table 2-13	Number of mixed-gear sablefish target trips	23
Table 2-14	Average # pots per vessel by subarea on observed sablefish target trips	23
Table 2-15	# pots per vessel on observed sablefish target trips	23
Table 3-1	Pounds of sablefish IFQ landed by gear type, 2014-2020.....	24
Table 3-2	Total GOA sablefish harvest (weight in tons) by subarea	24
Table 3-3	Percent of sablefish IFQ landed by pot/HAL in each subarea	25
Table 3-4	Average pounds per trip by gear type, by area.....	25
Table 4-1	Species groups and amount caught in the sablefish pot fishery, 2020. These data include retained and discarded amounts, excluding crab PSC.....	31
Table 4-2	Percent of incidental catch (excludes crab PSC)	32
Table 4-3	Percent retention of incidental catch in sablefish pots.....	32
Table 4-4	Halibut as a percent of total catch in the GOA sablefish IFQ fisheries.....	33
Table 4-5	Halibut caught in sablefish pot fishery	33
Table 4-6	Halibut caught in sablefish hook-and-line fishery.....	33
Table 4-7	Crab PSC in the GOA sablefish pot fishery, in numbers.....	33
Table 5-1	GOA sablefish IFQ catch volume (million lbs.) and ex-vessel value (million 2019\$)	35
Table 5-2	GOA sablefish IFQ catch volume (million lbs.) and ex-vessel value (million 2019\$) by gear type.....	35
Table 5-3	GOA sablefish IFQ ex-vessel price per pound (2019\$) by gear type, based on whole weight (round weight) and net weight.....	36
Table 5-4	GOA sablefish IFQ ex-vessel value (million 2019\$) and net weight price per pound (2019\$) by gear type and harvest area	36
Table 5-5	Percent landed weight of GOA fixed-gear sablefish (H&G), by gear type and market category (2017 through 2020)	38
Table 5-6	Estimated ex-vessel price per pound for fixed-gear H&G sablefish by gear type and market category (2017 through 2020); AKFIN statewide estimates of market category price applied to GOA sablefish landings; 2020 prices do not represent finalized CFEC Fish Ticket data.....	38
Table 5-7	Ex-vessel value (2019\$) of GOA sablefish IFQ by location of shoreside processing community, all gears.....	39
Table 5-8	Ex-vessel value (2019\$) of GOA sablefish IFQ by location of shoreside processing community, pot gear	39
Table 5-9	Shore-based processor participation in the GOA sablefish IFQ fishery, GOA sablefish IFQ ex-vessel payments, total payments by those processors, and the percentage of total payments attributed to the GOA sablefish IFQ fishery (2019\$), 2011 through 2019.....	40
Table 5-10	Shore-based processor participation in the GOA sablefish pot gear IFQ fishery, GOA sablefish pot gear IFQ ex-vessel payments, total payments by those processors, and the percentage of total payments attributed to the GOA sablefish IFQ fishery (2019\$), 2017 through 2019	40
Table 6-1	CP trips by observer coverage category, by year (2017 through 2020); Source: NMFS FMA.....	42

Table 6-2	GOA sablefish IFQ trips observed and percent of total GOA sablefish IFQ catch observed by Observer Program stratum and year, 2017 through 2020; Source: NMFS FMA	43
Table 6-3	Number of GOA sablefish IFQ trips where both pot and HAL gear were deployed, 2017 through 2020; Source: NMFS FMA.....	45
Table 7-1	Information on GOA sablefish pot fisheries from observer and logbook data by FMP sub-area and year.....	49
Table 7-2	Number of observer sampled sablefish lengths.....	52
Table 8-1	Average pots per string by subarea	55
Table 9-1	GOA Sablefish Pot tag limits and number of pot tags issued in 2020 for each regulatory area.....	60

List of Figures

Figure 1-1	Regulatory and reporting areas in the GOA.....	9
Figure 2-1	Sablefish IFQ vessel lengths (ft) by gear type, 2014-2020	14
Figure 2-2	Number of sablefish IFQ trips by gear type, 2014-2020.	22
Figure 3-1	Millions of pounds of sablefish IFQ landed by gear type, 2014-2020.....	24
Figure 3-2	Percent of GOA sablefish IFQ landings in pots	25
Figure 3-3	Spatial distribution of sablefish catch by HAL gear, 2017-2019.....	27
Figure 3-4	Spatial distribution sablefish catch by pot gear, 2017-2019.....	27
Figure 3-5	Spatial distribution of sablefish catch by pot gear, 2020.....	28
Figure 3-6	Percentage of total sablefish catch by pot gear, 2017-2019.....	28
Figure 3-7	Sablefish discards in the sablefish IFQ fisheries	29
Figure 4-1	Sablefish and incidental catch in the sablefish HAL and pot gear, 2017-2020	30
Figure 4-2	Incidental catch (non-sablefish, non-crab PSC) in the sablefish pot fishery, 2020	31
Figure 5-1	Percent landed weight of GOA fixed-gear sablefish (H&G), by gear type and market category (2014 through 2020)	37
Figure 6-1	Distribution of vessels by trip-count, grouped by gear type and monitoring stratum, 2017 through 2020; Source: NMFS FMA.....	44
Figure 6-2	Distribution of vessels by size, grouped by gear type and monitoring stratum, 2017 through 2020; Source: NMFS FMA.....	45
Figure 7-1	Whale depredation in the fishery, includes BS fishery.....	48
Figure 7-2	Length distribution of GOA sablefish IFQ catch by gear, 2017 through 2020 (Source: observer data provided by AFSC)	51
Figure 7-3	Length distribution of GOA sablefish IFQ catch by gear and area, 2017 through 2020 (Source: observer data provided by AFSC).....	51
Figure 8-1	Stackable, collapsible, and trapezoidal pots	53
Figure 8-2	Comparison of space required on deck for 60 large, stackable black cod pots (left) and 650 collapsible pots (right). Source: Fish Tech Inc., social media, June 2020.....	54
Figure 9-1	Examples of GOA sablefish IFQ pot tags and area-specific pot limits.....	58

Executive Summary

The intent of this review is to provide information on the first few years of the sablefish IFQ pot longline fishery in the Gulf of Alaska (GOA) since the implementation of Amendment 101 in 2017. GOA Amendment 101 allowed GOA sablefish IFQ to be fished with pot gear in a longline format in response to increased whale depredation on the hook-and-line (HAL) fishery. The amendment included a provision to allow the retention of incidentally caught halibut as well as several other elements that are described in Section 1.

The Council's motion at final action included a statement that a review on the effects of allowing GOA sablefish pot longline gear will be conducted three years after implementation. While the Council did not identify specific topics to be addressed in this review, the analysts focused this review on the general state of the fishery and some of the areas that were highlighted in the Amendment 101 analysis and during the Council's public hearings and deliberations. Due to delays in the Council meeting schedule resulting from the COVID-19 pandemic, some sections of this review have now benefitted from the inclusion of a fourth year of fishery data. In general, information about harvesting and monitoring is available through 2020 but information on revenues is currently only available through 2019.

A description of the history of Amendment 101 and background context on the action are included in Section 1. Section 2 describes participation in the sablefish IFQ fishery with a focus on breakouts comparing the use of pot to hook and line (HAL) gear. That section summarizes the communities, vessels, processors, crew, and measures of effort in the pot fishery compared to the GOA IFQ fishery as a whole. The inclusion of 2020 data provides evidence of a shift in the fishery from HAL toward pot gear usage for a significant number of participants, beyond that of the first three years after implementation of Amendment 101 (Figure 3-1). This is due to the negative impacts of whale depredation on HAL sablefish fishing described in the Amendment 101 analysis (NPFMC 2016), greater experience with – and trust in the efficacy of – the gear, and increasing adoption of lightweight, collapsible pot styles that allow smaller vessels to stow pots on deck with less impact on vessel carrying capacity (see Section 8).

Notable points:

- Pot gear effort in the GOA has increased since the fishery was opened in 2017 (Section 2.4); pots represent an increasing portion of the TAC caught each year (Section 3)
- The average sablefish catch *per trip* in pots has generally been higher than that of HAL, with the exception of the WY subarea (Section 3). However, a direct comparison of effort or CPUE between pot and HAL gear is not yet possible as these metrics are not equivalent and thus not standardized into one index (Section 7.2).
- Kodiak and Seward collectively account for over half of sablefish IFQ pot gear deliveries to shore-based processors (Section 2.2).
- Incidental catch in the GOA sablefish pot fishery is minimal and mainly comprised of Pacific halibut, arrowtooth flounder, grenadiers, and Pacific cod (Section 4). Pot longline gear has consistently caught a smaller percent of halibut than HAL gear in the sablefish IFQ fisheries.
- Total ex-vessel revenue and ex-vessel price per pound (2019\$) declined over the 2017-2019 period, tracking with a broad trend in the value of the fishery due to fish size and changes in foreign market demand for a variety of reasons. In 2019 and 2020, the pot gear category showed an increase in the proportion of fish landed at larger market sizes (3 lbs. and up) while the size distribution of HAL gear catch remained consistent with previous years. Ex-vessel price per pound data for 2020, which are only preliminary data at present, indicate that pot gear harvest

values on a per pound basis are catching up to or surpassing HAL gear harvest at the market category level (Section 5).

- The recent expansion of pot gear use into new vessel categories is reflected in terms of the observer coverage and electronic monitoring (EM) deployments across the GOA sablefish IFQ fishery. Adoption of pot gear by vessels in the EM pool has required NMFS and participants to coordinate in updating vessel monitoring plans, in some cases requiring the use of an additional camera for a sorting table (Section 6).
- A decline in overall tons of sablefish mortality due to whale depredation may be attributable to the shift to pot gear. This has not been fully investigated by the stock assessment authors; however, a brief synopsis of methodology and adjustment factors that are being made to account for whale depredation is included in Section 7.
- Discussions with fishery participants reflect that experimentation with pot longline gear is still occurring and that gear configurations and fishing strategies will likely continue to vary. Available information on the cost of pot gear and vessel-conversion is anecdotal, covering a wide range depending on the present state of a vessel and the type of pot longline setup that they plan to deploy. Cost information is difficult to collect systematically, even when volunteered, because adaptations to pot gear are often part of a broader vessel upgrade or refit (Section 8).
- NMFS recommends the Council consider whether pot tags continue to be a necessary provision of this program as they are costly to implement. According to enforcement and Coast Guard representatives, this gear marking requirement has not been useful for the enforcement of pot limits (Section 9.1).
- Section 9.2 revisits the regulatory status of AIS use on fishing gear and outlines the prospects for changes to that status in the coming years.

The analysts attempted to include information (when possible) on the other elements included in the action alternative from Amendment 101. These include impacts of pot limits, gear retrieval, and gear specifications on fishery operations and efficiency, and whether those regulations have influenced likelihood of gear conflicts or grounds preemption. Neither qualitative nor quantitative data on these topics have been collected in a standardized way, and varying perspectives on these issues likely exist. The analysts believe these topics may be best informed through public testimony and stakeholder engagement. A non-exclusive list of topics in this category and reasons for their potential continued interest from the Council are briefly described in Section 10.

1 Introduction and History of Action

The intent of this review is to evaluate the sablefish pot fishery in the Gulf of Alaska (GOA) since its implementation in 2017 with GOA Amendment 101. The GOA includes all waters in the exclusive economic zone (EEZ) along the southeastern, southcentral and southwestern coasts of Alaska from Dixon Entrance to Unimak Pass. The GOA Fishery Management Unit is subdivided for management purposes into three regions; the Western GOA (WGOA/WG), Central GOA (CGOA/CG) and Eastern GOA (EGOA). For the purposes of this review, some of the tables will refer to the WGOA (610), CGOA (620 and 630), Western Yakutat (WY) District (640), and the Southeast (SE) District (650), shown in Figure 1-1.

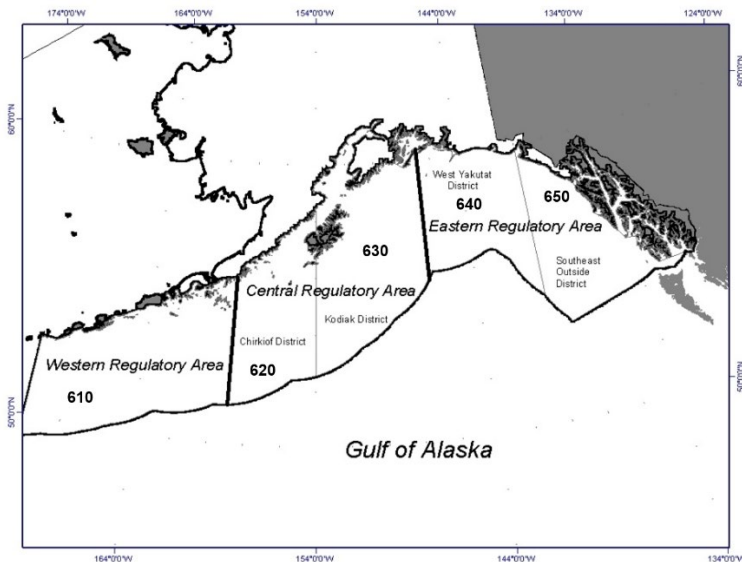


Figure 1-1 Regulatory and reporting areas in the GOA

Amendment 14 to the GOA Fishery Management Plan banned the use of pots for fishing for sablefish in the GOA; the rule became effective on November 18, 1985. The Council had decided that gear and area restrictions and apportionments to gear types would be most effective at addressing fishing grounds preemption and wastage problems in the fishery. Prior to implementation of Amendment 14, pots were legal gear in the GOA. According to the proposed rule for Amendment 14, pots had been used periodically in the sablefish fishery off Alaska since the mid-1970s, although hook-and-line (HAL) vessels dominated the fishery. Directed fishing for sablefish using trawls and gillnets was also minimal. As the sablefish catch limits (then set at optimum yield (OY)) became fully harvested in each of the sablefish regulatory areas of the GOA in the early 1980s, it became apparent that the sablefish resource would be insufficient to accommodate all users. In January 1985, however, three large vessels fished for sablefish using pot gear, catching roughly 34 percent of the combined Southeast and East Yakutat district OY. When the pot vessels left the area to unload their catch, some pots were stored on the grounds, preempting the grounds and creating the potential for gear conflicts. HAL fishermen testified to the Council that the presence of just one or two vessels using pot gear could preempt a substantial area, forcing HAL fishermen to move to avoid gear loss. Pots lost or stored on the fishing grounds over a long period of time also contributed to those problems.

Pot gear was phased-out sequentially starting in the Eastern area in 1986, in the Central area in 1987, and in the Western area in 1989. The phased implementation of Amendment 14 was determined to accommodate individuals in the CGOA and WGOA who impressed upon the Council that they needed time to transition away from their investment in pot gear, either to HAL gear or into other fisheries.

Additional history on the early domestic GOA sablefish fishery and the phase-out of pot gear during the 1980s is available in Section 2.1.1 of the EA/RIR for Amendment 101 (NPFMC 2016).

Since 2006, the Council had received testimony and written comment concerned with the whale interactions in the HAL fishery. These interactions often result in depredation, the technical term for whales stealing or damaging fish caught on fishing gear. After several rounds of proposals and discussion papers (NPFMC 2012, NPFMC 2014, NPFMC 2015) the Council adopted the following purpose and need statement in December 2014:

Interactions with whales throughout the GOA affect the ability of sablefish quota share holders to harvest their sablefish IFQ by reducing catch per unit of effort and increasing fishing costs. Research into developing technological solutions to deter whales and changes in fishing strategies has not resolved the problem. Additional sablefish mortality associated with whale depredation is difficult to quantify, but increases total mortality and uncertainty in sablefish abundance indices. The use of pot gear will also reduce the incidental take of seabirds. The use of pot gear for sablefish could reduce sperm whale and killer whale interactions with fishing gear in the GOA. The Council seeks to reduce the problems associated with whale depredation while minimizing gear conflicts that could result from allowing pot and longline gear to fish in the same regulatory areas.

In April 2015, the Council established a preferred alternative¹ to allow for sablefish pot fishing in the GOA in response to increased sperm whale depredation, which included a provision to allow the retention of incidentally caught halibut. The Council's motion at final action read as follows:

Allow the use of pot longline gear in the GOA Sablefish IFQ fishery.

Element 1. Pot limits

Limit of 120 pots per vessel in WY and SEO.

Limit of 300 pots per vessel in WGOA and CGOA.

Option 1. Require identification tags for each pot.

Pot tags must be attached to the vessel's pots before leaving port. Pots registered to one vessel must be returned to shore before being registered to another vessel.

Element 2. Gear retrieval

Gear cannot be left for more than 5 days without being moved in CGOA and WY.

Gear cannot be left for more than 7 days without being moved in WGOA.

In SEO, gear cannot be left on the fishing grounds when the vessel to which the pots are registered leaves the grounds to make a delivery.

All sablefish pots set in GOA must be removed prior to the end of the season and cannot be set before the beginning of the season.

Element 3. Gear specifications

Require both ends of the sablefish pot longline set to be marked with a 4-buoy cluster including a hard ball with "PL" (pot longline) marking on one buoy, flagpoles, and radar reflectors, including ADF&G number or Federal fisheries permit number on buoys.

Element 4. Retention of incidentally caught halibut

¹ <https://npfmc.legistar.com/View.ashx?M=F&ID=3702492&GUID=2A0DE356-9E58-4E4C-A066-30DF11E98296>

Require the retention of halibut caught incidentally in sablefish pots, provided the sablefish IFQ holder also holds sufficient halibut IFQ, and provided that the IPHC adopts complementary regulations that would allow NMFS to authorize retention of halibut caught incidentally in the sablefish pot longline fishery under the requirements of regulations implementing this program.

Additionally, all vessels using pot longline gear are required to use logbooks and VMS. Add a data field, or fields, to the Prior Notice of Landing for a pot longline vessel to declare the number of pots fished, lost, and/or still fishing.

IFQ holders fishing sablefish pots are encouraged to work cooperatively to develop electronic reporting protocols for reporting the location of pots being fished and/or pots left on the fishing grounds, as well as any other methods or methodology that may enhance the sablefish pot longline fishery.

The Council's motion also included a statement that a review on the effects of allowing GOA sablefish pot longline gear will be conducted three years after implementation. NMFS has included pot gear effort in their annual management reports for the past three years in response to the Council. The final rule for Amendment 101 ([81 FR 95435](#)) was published in December 2016, and regulations became effective January 27, 2017.

The review of GOA sablefish pots was originally scheduled for the April 2020 Council meeting. However, that meeting was cancelled due to the COVID-19 pandemic. Concurrent scheduling changes and reprioritization of Council agenda items delayed the review until the April 2021 Council meeting. Due to this delay, the analysts were able to include 2020 data on pot fishing in the sablefish IFQ fishery, which provided evidence of a significant shift in the fishery from HAL to pot gear usage.

IPHC Action

In November 2015, the Council wrote a letter to the IPHC requesting an amendment to make pot gear legal gear for halibut in IPHC areas overlapping the GOA.² The Council did not define "incidental," but in its letter assured the IPHC that it would monitor the amount and size of halibut caught in GOA sablefish pots so that it would be equipped with the information necessary to limit retention should it become an issue for the IPHC in the future. The IPHC responded favorably to the Council's request and, at its January 2016 Annual Meeting, took action to make pot longline gear legal for halibut retention in all areas off Alaska provided such retention was authorized by NMFS.

BSAI Amendment 118

In June 2017, the Council received a public comment letter describing a worsening situation of whale depredation of hook-and-line (HAL) gear in the BSAI sablefish fishery. The Council requested a few iterations of analysis (NPFMC 2018a, NPFMC 2018b, NPFMC 2018c) as the action was shaped, responding to public testimony and due to the IPHC's action in 2016. The purpose of the action was to allow for more efficient harvest of the halibut resource by decreasing the wastage of legal-size halibut discarded in the BSAI sablefish pot fishery, and to allow for the possibility of reduced whale depredation of halibut off of hook-and-line gear. In October 2018, the Council took final action. The final rule ([85 FR 840](#)) for BSAI Amendment 118 was published in January 2020, and implementing regulations became effective February 7, 2020. Similar to GOA Amendment 101, the Council intends to review the effects of allowing retention of halibut in pot gear in the BSAI three years after implementation.

² <http://npfmc.legistar.com/gateway.aspx?M=F&ID=8bc9eb92-da18-4e5d-883d-10b8f8014428.pdf>

2 Participation in the Fishery

This section provides information on vessel and crew participation, processing communities, and effort in the sablefish pot fishery in the GOA. Information is focused on the four years of data collected since pot gear was permitted (2017-2020) with comparisons to the three preceding years when only hook-and-line (HAL) gear was allowed (2014-2016) for the sablefish IFQ fishery in the GOA.

2.1 Vessels

Since implementation of Amendment 101, 110 unique vessels have fished for sablefish with pots. However, not all vessels fished every year. Over the last four years, the number of pot vessels harvesting sablefish IFQ has increased each year, from 22 in 2017 to 104 in 2020 (Table 2-1). The first three years after implementation did not see large increases in the number of vessels using pots to fish for sablefish IFQ, but in 2020, the number of vessels significantly increased. Despite the increase in the number of pot vessels participating in the sablefish fishery, the overall number of vessels harvesting sablefish IFQ in the GOA (HAL and pot vessels combined) has continued to decline in recent years, from 299 vessels in 2014 to 254 vessels in 2020 (Table 2-1). In 2020, 69 of 254 vessels that fished sablefish IFQ used a combination of pot and HAL gear. The majority of vessels that fished GOA sablefish with pots during the 2017-2020 period had previously fished GOA sablefish IFQ during the analyzed period, dating back to 2014. Twenty-eight vessels that fished sablefish with pots in 2017-2020 had not participated in the GOA sablefish IFQ fishery from 2014-2016, indicating that a portion of vessels had not been participating in the GOA sablefish IFQ fishery directly prior to implementation of pot gear. Most of these vessels appeared in the data only in 2020, not during the 2017-2019 period.

The Central Gulf of Alaska (CG) has had the highest level of participation in terms of number of pot vessels. In 2020, 72 vessels fished sablefish with pots in the CG (Table 2-2) and 55 of 104 vessels fished in more than one subarea. Eighteen vessels fished in three sub-areas, and two vessels fished in all four areas.

Table 2-1 Number of vessels that harvested sablefish IFQ in the GOA, by gear type

GOA Sablefish IFQ Vessels by Gear Type				
Year	# Pot vessels	# HAL vessels	All vessels that fished GOA sablefish IFQ	Vessels that used both pot and HAL
2014		299	299	
2015		293	293	
2016		290	290	
2017	22	276	283	15
2018	23	270	281	12
2019	32	251	265	18
2020	104	219	254	69

Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN in Comprehensive_BLEND_CA

Table 2-2 Vessels that harvested sablefish IFQ by GOA subarea and gear type

Year	WG		CG		WY		SE	
	Pot	HAL	Pot	HAL	Pot	HAL	Pot	HAL
2014		59		168		103		183
2015		54		161		99		178
2016		61		156		103		177
2017	6	54	18	144	10	96	10	166
2018	11	50	17	136	9	89	12	169
2019	14	39	24	119	14	82	14	159
2020	27	24	72	86	39	68	44	143

Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN in Comprehensive_BLEND_CA

Note: Includes vessels that fished multiple areas or both gear types (vessels are double counted if they fished in more than one area or used both gears).

During the development of Amendment 101, fishermen’s perspectives on legalizing pot fishing gear for sablefish in the GOA were varied. Research conducted by Peterson and Carothers (2013)³ indicated that, in general, sablefish longliners operating vessels greater than 60 feet were most likely to agree that the transition to pot gear was a feasible option for them. The majority of fishermen operating with smaller vessels or fishing out of Southeast Alaska reported the transition to pot gear would be less feasible for their operations. That hesitancy was largely due to the space and stability needed to fish with pots; larger vessels would be better suited to take advantage of the opportunity to harvest sablefish with pots.

Figure 2-1 illustrates the distribution of vessel sizes used to harvest sablefish IFQ in the HAL fishery (2014-2020) and the pot fishery (2017-2020). Size classes are delineated at 40 feet, 50 feet, and 60 feet length overall (LOA). Fifty-one percent of HAL vessels that fished sablefish IFQ prior to Amendment 101 (during the 2014-2016 period) were in the 50-60-foot LOA range. From 2014-2016, vessels smaller than 40 ft LOA constituted about 7% of all vessels in the GOA sablefish IFQ fishery (Figure 2-1, Table 2-3). No vessels under 40 feet LOA fished GOA sablefish IFQ with pots until 2020, when two vessels began using pot gear. According to data from the Catch Accounting System (CAS), which is a blend of CFEC/ADF&G Fish Ticket and Observer Program data, the smallest vessel that landed GOA sablefish IFQ using pots was 35 feet. Starting in 2020, one catcher/processor (CP) used pots to fish sablefish IFQ in the GOA. The largest proportion of sablefish IFQ vessels still falls within the 50-60 feet LOA range.

The recent adoption of pot gear on smaller vessels indicates that sentiments about the feasibility of pot gear and its benefits across user groups has shifted since the 2013 survey research was published, at least for some. The development of new pot designs that are lighter and more easily stackable on small decks have likely contributed to increased pot gear use on smaller vessels (see Section 8). Individuals familiar with the fishery indicate that experimentation with different gear configurations and fishing strategies is still occurring (see Section 8).

Table 2-4 shows that the adoption of pot gear by smaller vessels is not confined to a single GOA subarea. The number of vessels of less than 60’ using pot gear increased for all areas in 2020. The largest jump in participation by vessels of less than 50’ was in the CG (up from 1 to 11 vessels from 2019 to 2020). A vessel of less than 40’ participated for the first time in 2020 in the WG, CG, and SE.

³ Based on 70 semi-directed interviews and 95 written surveys conducted with longline fishermen in Alaska.

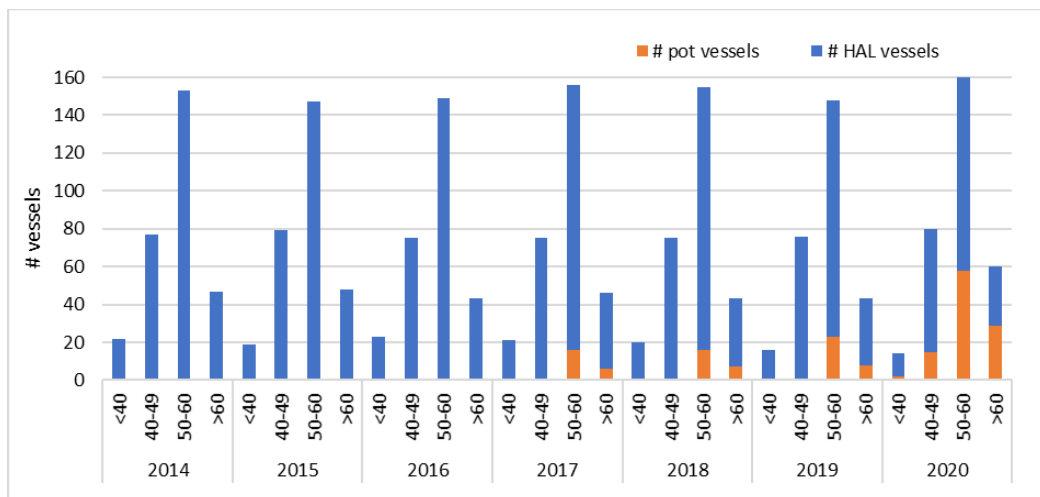


Figure 2-1 Sablefish IFQ vessel lengths (ft) by gear type, 2014-2020

Source: NMFS AKR CAS, data compiled by AKFIN in Comprehensive_BLEND_CA

Note: vessels are counted in both gear types (double counted) if they used more than one gear type.

Table 2-3 Number of vessels in each length category by gear type and year

Year	Length (ft)	# pot vessels	# HAL vessels	Total # vessels
2014	<40		22	22
	40-49		77	77
	50-60		153	153
	>60		47	47
2015	<40		19	19
	40-49		79	79
	50-60		147	147
	>60		48	48
2016	<40		23	23
	40-49		75	75
	50-60		149	149
	>60		43	43
2017	<40		21	21
	40-49		75	75
	50-60	16	140	145
	>60	6	40	42
2018	<40		20	20
	40-49		75	75
	50-60	16	139	147
	>60	7	36	39
2019	<40		16	16
	40-49	1	75	75
	50-60	23	125	135
	>60	8	35	39
2020	<40	2	12	12
	40-49	15	65	67
	50-60	58	111	133
	>60	29	31	42

Source: NMFS AKR CAS, data compiled by AKFIN in Comprehensive_BLEND_CA

Table 2-4 Number of vessels by length and gear type in each area

LENGTH	AREA	YEAR	Vessel Count (Pot)	Vessel Count (HAL)	LENGTH	AREA	YEAR	Vessel Count (Pot)	Vessel Count (HAL)
<40'	WG	2017	-	8	50-60'	WG	2017	5	20
		2018	-	5			2018	7	21
		2019	-	4			2019	10	15
		2020	1	2			2020	15	7
	CG	2017	-	6		CG	2017	13	70
		2018	-	9			2018	11	63
		2019	-	7			2019	17	50
		2020	1	4			2020	35	28
	WY	2017	-	-		WY	2017	7	61
		2018	-	1			2018	7	55
		2019	-	1			2019	10	45
		2020	-	-			2020	20	40
	SE	2017	-	9		SE	2017	9	97
		2018	-	9			2018	10	99
		2019	-	8			2019	10	97
		2020	1	8			2020	33	89
40-49'	WG	2017	-	9	>60'	WG	2017	1	17
		2018	-	12			2018	4	12
		2019	-	10			2019	4	10
		2020	1	8			2020	10	7
	CG	2017	-	33		CG	2017	5	35
		2018	-	34			2018	6	30
		2019	1	33			2019	6	29
		2020	11	31			2020	25	23
	WY	2017	-	6		WY	2017	3	29
		2018	-	7			2018	2	26
		2019	1	9			2019	3	27
		2020	2	4			2020	17	24
	SE	2017	-	39		SE	2017	1	21
		2018	-	41			2018	2	20
		2019	1	37			2019	3	16
		2020	3	34			2020	7	12

Community of ownership addresses for vessels that used pots to fish sablefish IFQ in the GOA are shown in Table 2-5. These Fish Ticket data are not yet available for 2020, therefore they do not illustrate the increase in participation in 2020. Of the 37 unique vessels that participated in the GOA sablefish pot fishery between 2017-2019, 25 of those vessels (61%) had ownership addresses within Alaska. Thirty percent of the vessels have ownership addresses in Washington state, and roughly 8% (2 vessels) in Oregon. The Alaska communities where the highest proportion of GOA sablefish pot vessels are owned are Kodiak (~12%), Seward (~8%), Sitka (~8%), and Douglas (~7%). Vessels with ownership addresses

in Seattle represent about 8% of GOA sablefish pot vessels. Washington vessels comprise 30% of all GOA sablefish pot vessels, and only 20% of the overall sablefish IFQ fleet in the GOA (Table 2-6), which has been predominantly made up of vessels with ownership addresses within Alaska, since 2014.

Table 2-5 Catcher Vessels in the GOA Pot Sablefish IFQ fishery by Community of Vessel Historic Ownership Address, 2017-2019 (number of vessels)

Community	2017	2018	2019	Annual Average 2017-2019 (number)	Annual Average 2017-2019 (percent)	Unique Vessels 2017-2019 (number)
Anchorage	0	0	1	0.3	1.3%	1
Delta Junction	0	0	1	0.3	1.3%	1
Girdwood	1	1	1	1.0	3.9%	1
Homer	0	1	3	1.3	5.2%	3
Kodiak	2	2	5	3.0	11.7%	5
Seward	2	2	2	2.0	7.8%	2
Cordova	1	1	2	1.3	5.2%	2
Douglas	2	2	1	1.7	6.5%	2
Haines	0	0	1	0.3	1.3%	1
Juneau	0	1	0	0.3	1.3%	1
Ketchikan	1	0	1	0.7	2.6%	2
Petersburg	2	1	1	1.3	5.2%	3
Sitka	2	2	2	2.0	7.8%	2
Alaska Total	13	13	21	15.7	61.0%	25
WA	6	8	9	7.7	29.9%	10
OR	2	1	1	2.0	7.8%	2
Other States	1	1	1	1.0	3.9%	1
Grand Total	22	23	32	25.7	100.0%	37

Note: Due to catcher vessel ownership movement between communities over the years shown, total unique catcher vessels per community may not sum to state or grand totals. Table includes vessels that landed sablefish using pot gear.
Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT.

Table 2-6 Catcher Vessels in the GOA Sablefish IFQ Fishery by Community of Vessel Historic Ownership Address, 2014-2019 (number of vessels)

Community	2014	2015	2016	2017	2018	2019	Annual Average 2014-2019 (number)	Annual Average 2014-2019 (percent)	Unique Vessels 2014-2019 (number)
Anchor Point	3	3	1	1			2.0	0.7%	3
Anchorage	2	2	2	2	1	2	1.8	0.6%	3
Auke Bay	2	1	1	1	1	2	1.3	0.5%	3
Cordova	5	4	4	4	5	5	4.5	1.6%	6
Craig	3	4	5	4	4	4	4.0	1.4%	6
Delta Junction	3	3	4	4	5	5	4.0	1.4%	5
Douglas	6	5	4	5	5	4	4.8	1.7%	7
Dutch Harbor	1	1	1	1	1	1	1.0	0.4%	1
Eagle River	1	1	1	1	1		1.0	0.4%	1
Elfin Cove	1	1	1	1	2	2	1.3	0.5%	2
Fairbanks		1		1			1.0	0.4%	1
Fritz Creek	2	1	1	1	2	1	1.3	0.5%	2
Girdwood				1	1	1	1.0	0.4%	1
Gustavus	1				1		1.0	0.4%	2
Haines	5	4	3	4	4	2	3.7	1.3%	6
Homer	35	36	39	43	41	32	37.7	13.3%	58
Hoonah	2	2	2	2	1	1	1.7	0.6%	2
Juneau	12	15	17	12	10	9	12.5	4.4%	21
Ketchikan	3	3	4	5	4	4	3.8	1.4%	6
Kodiak	21	22	20	19	20	19	20.2	7.1%	29
Nikolaevsk	1	1		1			1.0	0.4%	1
Palmer	1		2				1.5	0.5%	2
Pelican	1	1	1	1	1	2	1.2	0.4%	2
Petersburg	30	28	28	27	29	26	28.0	9.9%	37
Port Alexander	1						1.0	0.4%	1
Seldovia	3	2	2	2	1	1	1.8	0.6%	4
Seward	5	6	6	7	7	4	5.8	2.1%	9
Sitka	57	57	56	56	57	59	57.0	20.2%	78
Soldotna	2	2	2	1		2	1.8	0.6%	4
Sterling	2	2	2	2	2	2	2.0	0.7%	2
Valdez			1	1	1	1	1.0	0.4%	1
Ward Cove						1	1.0	0.4%	1
Wasilla	1	1	1		2	2	1.4	0.5%	4
Wrangell	4	3	3	3	4	4	3.5	1.2%	5
Yakutat		1		1	2	2	1.5	0.5%	3
Alaska Total	216	213	214	214	215	200	212	74.96%	297
WA	63	64	59	55	53	51	58	20.33%	79
OR	8	7	7	4	6	5	6	2.18%	11
Other States	7	7	8	8	6	7	7	2.53%	11
Grand Total	294	291	288	281	280	263	283	100.00%	385

Note: Due to catcher vessel ownership movement between communities over the years shown, total unique catcher vessels per community may not sum to state or grand totals. Black vertical line between 2016 and 2017 notes implementation of pots.
Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT.

2.2 Processors and ports of landing

Fifty-one processors in the Gulf of Alaska, Bering Sea, and Washington state accepted deliveries of sablefish IFQ caught in the GOA between 2014 and 2019 (Table 2-7). Of those, 55% (28 processors) accepted deliveries made by vessels using pots from 2017 through 2019 (Table 2-8). The majority of

processors accepting GOA sablefish IFQ pot deliveries are in the Central GOA (Kodiak and Seward), and none were offshore processors.

Table 2-7 Shore-Based Processors and Floating Processors (SBPRs) Accepting GOA Sablefish IFQ Deliveries by Community of Operation, 2014-2019 (number of processors)

Port Area	City	2014	2015	2016	2017	2018	2019	Annual Average 2017-2019 (number processors)	Annual Average 2017-2019 (percent of total processors)	Total Unique SBPRs 2014-2019 (number)
BS	Akutan	1	1	1	1	1	1	1.0	2.9%	1
	Dutch Harbor	1	1	1	1	1	2	1.2	3.4%	2
BS Total		2	2	2	2	2	3	2.2	6.3%	3
Central Gulf	Anchorage	1	1	1	1	1	1	1.0	2.9%	1
	Homer	2	2	2	2	2	2	2.0	5.9%	5
	Kenai	1	2	1	2	1	1	1.3	3.9%	3
	Kodiak	5	5	6	5	6	5	5.3	15.6%	7
	Seward	3	3	3	3	3	4	3.2	9.3%	4
CG Total		12	13	13	13	13	13	12.8	37.6%	20
Southeast	Cordova	2	1	2	1	3	3	2.0	5.9%	3
	Craig	0	1	1	1	1	2	1.0	2.9%	2
	Haines	0	0	0	1	1	1	0.5	1.5%	2
	Hoonah	1	1	1	1	1	1	1.0	2.9%	1
	Juneau	2	2	2	2	2	2	2.0	5.9%	2
	Ketchikan	1	2	2	2	2	2	1.8	5.4%	2
	Pelican	0	0	0	0	1	1	0.3	1.0%	1
	Petersburg	2	2	2	2	2	3	2.2	6.3%	3
	Sitka	2	2	2	3	3	3	2.5	7.3%	3
	Valdez	1	1	1	0	0	0	0.5	1.5%	1
	Wrangell	1	1	1	1	1	1	1.0	2.9%	1
	Yakutat	1	1	1	1	1	1	1.0	2.9%	2
SE Total		13	14	15	15	18	20	15.8	46.3%	23
WG	False Pass	1	1	1	1			1.0	2.9%	1
	King Cove	1	1	1	2	2	2	1.5	4.4%	2
	Sand Point	1	1	1	1	1	1	1.0	2.9%	1
WG Total		3	3	3	4	3	3	3.2	9.3%	4
WA	Seahurst	0	0	0	0	1	0	0.2	0.5%	1
WA Total		0	0	0	0	1	0	0.2	0.5%	1
Grand Total		30	32	33	34	37	39	34.2	100.0%	51

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT.

Note: *Includes Floating Processors

Table 2-8 Shore-Based Processors and Floating Processors in Alaska Accepting GOA Sablefish IFQ Pot Deliveries by Community of Operation, 2017-2019 (number of processors)

Port Area	City	2017	2018	2019	Annual Average 2017-2019 (number processors)	Annual Average 2017-2019 (percent of total processors)	Total Unique SBPRs 2017-2019 (number)
BS	Akutan	1	1	1	1.0	2.7%	1
	Dutch Harbor	1	1	2	1.3	3.6%	2
BS Total		2	2	3	2.3	6.3%	3
CG	Anchorage	0	0	1	0.3	0.9%	1
	Kodiak	3	3	5	3.7	9.9%	5
	Seward	3	3	4	3.3	9.0%	4
CG Total		6	6	10	7.3	19.7%	10
Southeast	Cordova	1	1	3	1.7	4.5%	4
	Juneau	2	1	1	1.3	3.6%	2
	Ketchikan	1	0	0	0.3	0.9%	1
	Pelican	0	1	1	0.7	1.8%	2
	Petersburg	2	2	2	2.0	5.4%	2
	Sitka	2	2	2	2.0	5.4%	3
	Wrangell	1	1	0	0.7	1.8%	4
	Yakutat	1	1	1	1.0	2.7%	1
SE Total		10	9	10	9.7	26.0%	13
WG	King Cove	1	1	1	1.0	2.7%	2
	Sand Point	1	1	1	1.0	2.7%	1
WG Total		2	2	2	2.0	5.4%	2
Grand Total		20	19	25	21.3	100.0%	28

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT.

Note: *Includes Floating Processors

Table 2-9 ranks ports of landing by the percentage of all GOA sablefish caught in pots that were landed at each port in 2020. (The values in the first column of the table sum to 100%.) Of the total GOA sablefish pot harvest, 30% was landed in Kodiak and 21% was landed in Seward. If GOA sablefish harvested in pots were landed at ports with fewer than three processors, these data are considered confidential ('C'). Of all GOA sablefish IFQ (pot and HAL) delivered to Kodiak, 76% was caught by vessels using pots; in Seward 60% was caught by vessels using pots (shown in the second column). Kodiak and Seward also had the highest number of deliveries of pot-caught sablefish and the largest amount of unique vessels landed pot-caught sablefish at these ports(Table 2-9).

Table 2-9 Top Ports of Landing Ranked by % of GOA Sablefish Caught in Pots, 2020

Port of Landing	% of <u>all</u> GOA pot-caught sablefish IFQ sold at this port	% pot-caught sablefish, port level	# deliveries of pot-caught sablefish	# distinct vessels delivered pot-caught sablefish
KODIAK	30%	76%	156	47
SEWARD	21%	60%	142	36
DUTCH/UNALASKA	C	97%	33	16
SAND POINT	C	91%	24	11
KING COVE	C	76%	25	11
JUNEAU	C	37%	42	20
AKUTAN	C	91%	12	6
SITKA	3%	9%	56	18
CORDOVA	3%	38%	24	13
YAKUTAT	C	17%	27	13
HOMER	C	45%	16	10
PETERSBURG	2%	15%	25	11
WHITTIER	C	83%	9	4
WRANGELL	C	43%	7	4
HOONAH	C	27%	5	3
BELLINGHAM, WA	C	47%	3	3
CRAIG	C	20%	3	1
KETCHIKAN	C	14%	3	2
PELICAN	C	28%	1	1
ASTORIA, OR	C	100%	1	1
ELFIN COVE	C	0%	0	0
OTHER AK	C	0%	0	0

Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN in Comprehensive_BLEND_CA. Note: 'C' indicates confidential data.

The analysis for GOA Amendment 101 predicted that “because the GOA sablefish fishery is an area-based IFQ fishery that is typically fully harvested, the gear used to make the catch should not affect the total amount of deliveries to processors in each area” (NPFMC 2016). As described further in Section 2.4 and Section 3, the overall number of trips (Figure 2-2, Table 2-12) and amount of sablefish IFQ harvested in the GOA (Figure 3-1) has not changed significantly over the past several years.

The proportion of the total GOA IFQ sablefish sold at each port of landing has stayed relatively stable in most areas before and after the implementation of pot gear, with a few exceptions. Due to confidentiality restrictions much of these data cannot be shown, however, the analysts evaluated changes (using data from the Catch Accounting System) in the amount of sablefish landings after implementation of the pot fishery. While the amount of GOA IFQ sablefish sold in Kodiak has increased over the years, Kodiak’s proportion of total IFQ has decreased roughly 3% before and after the implementation of pots. The proportion of the total GOA sablefish IFQ sold roughly doubled in Dutch Harbor/Unalaska, and Seward has experienced a downward trend, with a decrease of roughly 6% over the 2014-2020 period.

Fluctuations in the number of trips and amount of catch are also influenced by changes in abundance (and thus TAC) and the distribution of fish across areas.

2.3 Individual harvesters and crew

In the Amendment 101 analysis, fleet consolidation was considered as a potential threat to the number of total available crew jobs. As described in that analysis, pot longline operations do not appear to have inherently more or fewer crew onboard than do HAL vessels. The average number of sablefish IFQ permit holders onboard vessels does not indicate a significant consolidation of permits at the trip level. Table 2-10 indicates that the number of sablefish IFQ permit holders aboard pot vessels per trip has been roughly the same as those aboard sablefish HAL vessels since implementation of Amendment 101. With additional years of data that extend beyond the 2020 uptick in pot gear adoption, it is possible that permits/trip could increase as additional quota holders recognize benefits in terms of catchability or whale depredation loss; however, one year of data is not sufficient to identify a trend. While crew data is often entered inconsistently, data show that – when accounting for vessel size – the average number of crew is similar across gear types (Table 2-11).

Table 2-10 Average number of sablefish IFQ permit holders per vessel

Year	# permits/trip (pot)	# permits/trip (HAL)
2014	-	1.4
2015	-	1.4
2016	-	1.4
2017	1.4	1.4
2018	1.4	1.3
2019	1.5	1.3
2020	1.3	1.2

Source: NMFS Restricted Access Management (RAM) division sourced through AKFIN

Table 2-11 Average crew size by vessel length and gear type

Year	Vessel length	HAL avg crew size	Pot avg crew size
2017	<40	2.9	
	<50	3.4	
	<60	4.4	4.2
	>60	4.8	4.6
	All	3.9	4.4
2018	<40	2.8	
	<50	3.4	
	<60	4.4	4.3
	>60	4.8	4.8
	All	3.9	4.5
2019	<40	2.9	
	<50	3.4	4.5
	<60	4.2	4.2
	>60	4.8	4.6
	All	3.8	4.4
Average		3.9	4.5

Source: ADFG/CFEC Fish Tickets, NMFS Alaska Region Catch Accounting System

2.4 Effort

Figure 2-2 demonstrates that the total number of sablefish IFQ trips taken has stayed relatively stable after the implementation of Amendment 101. Table 2-12 breaks down the number of trips (by subarea) taken by vessels fishing sablefish IFQ using HAL and pots from 2014-2020. Comparing effort of vessels using pot gear with vessels using HAL gear is not the same as comparing hook to hook, pot to pot or time on the grounds, but number of trips taken (number of landings) provides one measure of effort. While the number of trips taken using pot gear has been generally increasing, there are no clear trends in the number of HAL trips overall except in the WGOA where HAL trips have decreased over time. Effects on the number of trips taken in 2020 may have been compounded by impacts of the COVID-19 pandemic.

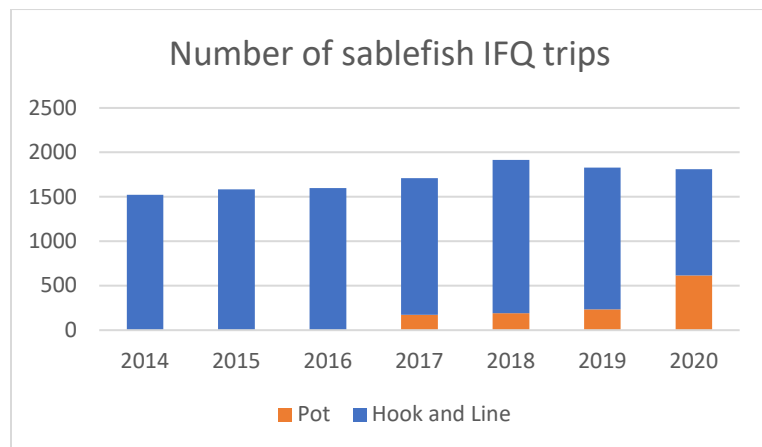


Figure 2-2 Number of sablefish IFQ trips by gear type, 2014-2020.

Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN in Comprehensive_BLEND_CA..

Table 2-12 Number of trips by subarea and gear type

Year	WG		CG		WY		SE	
	Pot	HAL	Pot	HAL	Pot	HAL	Pot	HAL
2014	-	172	-	606	-	207	-	539
2015	-	192	-	596	-	229	-	566
2016	-	197	-	651	-	222	-	530
2017	29	158	91	606	20	202	33	572
2018	51	136	94	687	14	242	31	662
2019	38	118	124	583	32	244	41	649
2020	79	43	300	330	101	194	134	631

Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN in Comprehensive_BLEND_CA..

The number of trips on vessels that used a combination of HAL and pot gear (known as mixed-gear trips) appears to be increasing. Using data from Commercial Fisheries Entry Commission (CFEC) Fish Tickets, in 2020, 4% of sablefish target trips were mixed-gear trips, while less than 1% were mixed gear trips prior to 2020 (Table 2-13). In 2020, almost 10% of observed trips or EM trips were mixed-gear trips. Fishery participants may choose mixed-gear trips for sablefish only or use pots for sablefish and HAL gear for halibut. Some fishery participants have noted that fishing multiple gears can increase efficiency by soaking sablefish pots while fishing HAL gear for halibut. However, there are a few additional requirements for mixed-gear trips, such as a Prior Notice of Landing (PNOL) for an additional gear type and separation of fish in the hold if the same species is taken with different gear types. Vessels that fish mixed-gear trips can purchase a combined pot & HAL CFEC permit, which is more expensive than purchasing a single gear permit but does offer some savings compared to purchasing two different single-

gear permits (pot and HAL).⁴ The increase in the proportion of mixed-gear trips since implementation of Amendment 101 is described further in Section 6.

Table 2-13 Number of mixed-gear sablefish target trips

Year	One gear type	# Mixed HAL and pot trip	Total trips
2017	4131	15	4146
2018	4056	8	4064
2019	4126	21	4147
2020	3641	169	3810

Source: NMFS Alaska Region Catch Accounting System. Data compiled by NMFS AKR.

Vessels that fish sablefish pots must adhere to pot limits which are specific to each subarea. Pot limits are as follows: 120 pots per vessel in West Yakutat and Southeast outside waters (WY and SE), and 300 pots per vessel in Western GOA and Central GOA (WG and CG). According to Table 2-14, the average number of pots per vessel on most observed trips are well below the pot limits in each area, with vessels using fewer than the allowable number of pots. However, the sample size of these observed trips is small and some fishery participants have indicated that they are setting a full limit of pots. Public testimony may be able to provide further information on the number of pots they use and whether these limits are efficient from an operational standpoint. Table 2-15 indicates that some vessels are using far below the limit of pots on some trips, while others may be reaching (or even exceeding) pot limits.

Table 2-14 Average # pots per vessel by subarea on observed sablefish target trips
Pot limits for each area shown at top in parentheses.

Year	WG (300)	CG (300)	WY (120)	SE (120)
2017	34	156	67	74
2018	97	118	41	32
2019	-	83	52	38
2020	-	155	-	47

Source: NMFS AFSC Observer Program sourced through NMFS AKR, data compiled by AKFIN in Comprehensive_OBS.
Note: dash (-) indicates no observed trips.

Table 2-15 # pots per vessel on observed sablefish target trips

Year	Average # pots	Max # pots	Min # pots
2017	103	252	20
2018	101	276	35
2019	69	146	17
2020	140	427	20

Source: NMFS AFSC Observer Program sourced through NMFS AKR, data compiled by AKFIN in Comprehensive_OBS

3 Sablefish Harvest

3.1 Amount and spatial distribution of harvest

The amount of sablefish harvested by gear type has changed over the past few years with the introduction of sablefish pots, particularly in 2020 (Figure 3-1). In 2017 and 2018, pot fishing made up a small proportion of the fixed gear catch (10% and 12%, respectively) (Table 3-1). The proportion of fixed gear

⁴ See https://cfec.state.ak.us/forms/Permit_Fee_Table.pdf for the 2021 CFEC permit fee table.

catch in pots in the GOA increased to 21% in 2019 and then again to 48% in 2020. The overall sablefish IFQ catch in pots in the GOA increased each year from 898 t in 2017 to 4,620 t in 2020, while HAL catch decreased from 7,560t to 4,974t.

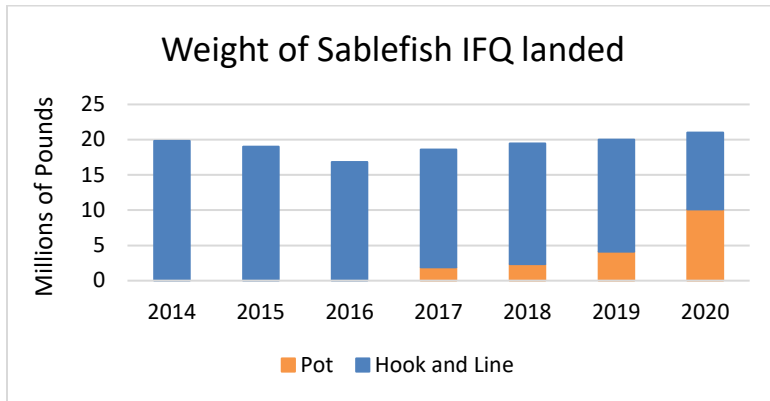


Figure 3-1 Millions of pounds of sablefish IFQ landed by gear type, 2014-2020
Source: NMFS Restricted Access Management (RAM) division sourced through AKFIN

Table 3-1 Pounds of sablefish IFQ landed by gear type, 2014-2020

	<i>Pot</i>	<i>Hook and line</i>	<i>TOTAL</i>	<i>% Pot</i>
2014		19,823,305	19,823,305	
2015		18,995,324	18,995,324	
2016		16,820,202	16,820,202	
2017	1,905,273	16,701,805	18,607,078	10%
2018	2,362,456	17,092,847	19,455,303	12%
2019	4,129,999	15,856,898	19,986,897	21%
2020	10,118,373	10,903,721	21,022,094	48%

Source: NMFS Restricted Access Management (RAM) division sourced through AKFIN.

The amount of sablefish caught in pots also varies across GOA subarea. Table 3-3 shows the percent of sablefish IFQ catch by GOA subarea that is harvested by the pot and HAL sectors. Over half of the GOA sablefish pot catch occurs in the CGOA. The percent of sablefish IFQ landings in pot gear has increased every year in every area except in WY from 2017-2018 (Table 3-3, Figure 3-2). In 2020, sablefish IFQ catch in pots exceeded HAL catch in the WGOA (85% pot) and CGOA (67% pot).

Table 3-2 Total GOA sablefish harvest (weight in tons) by subarea

Year	WG		CG		WY		SE		Total Pot	Total HAL
	Pot	HAL	Pot	HAL	Pot	HAL	Pot	HAL		
2014		1,106		3,759		1,464		2,695		9,023
2015		910		3,606		1,510		2,664		8,689
2016		904		3,147		1,271		2,310		7,632
2017	222	788	431	3,020	92	1,298	133	2,453	878	7,560
2018	355	739	541	2,860	37	1,488	161	2,668	1,094	7,755
2019	398	667	1,100	2,507	146	1,378	231	2,615	1,876	7,166
2020	1,052	184	2,531	1,250	540	1,078	496	2,462	4,620	4,974

Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN in Comprehensive_BLEND_CA
Note: Weight of whole fish, based on recovery rate

Table 3-3 Percent of sablefish IFQ landed by pot/HAL in each subarea

Year	WG		CG		WY		SE	
	% Pot	% HAL	% Pot	% HAL	% Pot	% HAL	% Pot	% HAL
2017	22%	78%	12%	88%	7%	93%	5%	95%
2018	33%	67%	16%	84%	2%	98%	5%	95%
2019	37%	63%	31%	69%	9%	91%	8%	92%
2020	85%	15%	67%	33%	33%	67%	16%	84%

Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN in Comprehensive_BLEND_CA

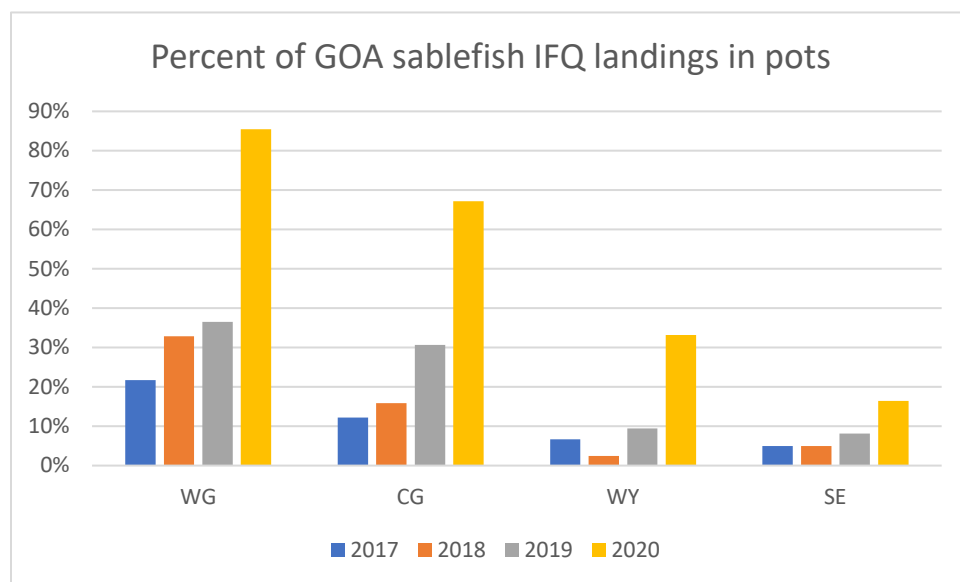


Figure 3-2 Percent of GOA sablefish IFQ landings in pots

Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN in Comprehensive_BLEND_CA

In 2017, the first year that pot gear was used to harvest sablefish in the GOA, pot vessels in WG caught more sablefish per trip on average than HAL vessels (Table 3-4). In 2018 and 2019, vessels using pot gear caught more sablefish per trip (on average) in every area except WY (Table 3-4). Overall, average sablefish catch per trip has declined in HAL gear, which may be indicative of the struggle of the HAL fleet to harvest sablefish in the presence of whales, described in the Amendment 101 analysis. In the WG and CG, average catch in pounds per trip almost doubled between 2017 and 2020. While there are several factors that could contribute to this increase (sablefish abundance, effort), it may also be reflective of the learning curve that comes with utilizing a new gear type for sablefish and the innovation and improvements in sablefish pot gear over the first few years of the gear’s development and use.

Table 3-4 Average pounds per trip by gear type, by area

Year	WG		CG		WY		SE		All areas	
	Pot	HAL	Pot	HAL	Pot	HAL	Pot	HAL	Pot	HAL
2014	-	14,184	-	13,567	-	15,702	-	10,967	-	13,007
2015	-	10,530	-	13,251	-	14,194	-	10,292	-	12,000
2016	-	10,104	-	10,660	-	12,640	-	9,593	-	10,513
2017	16,836	11,139	10,205	11,025	10,155	14,104	8,645	9,461	11,013	10,859
2018	15,326	11,759	12,633	9,153	5,880	13,553	10,031	8,951	12,434	9,897
2019	23,057	12,915	19,568	9,420	9,958	12,575	12,410	8,895	17,574	9,948
2020	29,302	9,146	18,524	8,224	11,671	12,228	7,966	8,596	16,479	9,102

Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN in Comprehensive_BLEND_CA.

Figure 3-3 through Figure 3-5 show the spatial distribution of IFQ sablefish catch since implementation of Amendment 101. However, there are several caveats to these data. Due to confidentiality concerns, multiple years are grouped together, though individual years show similar patterns. These data are from the Catch-in-Area (CIA) Trends database, which allocates catch based on blended processor-based data, Fish Tickets, observer data when available, and Vessel Monitoring System (VMS) data. This system has a tiered approach. Fisheries with robust monitoring (i.e., ample observer coverage and VMS) produce reliably accurate spatial data. Moving down the tiers, the data rely on extrapolation from vessels were subject to greater monitoring. As such, the IFQ fishery has some of the least accurate and precise data in the CIA because many vessels do not have VMS and all IFQ CVs are in the partial observer coverage category. However, per Amendment 101, all GOA IFQ vessels using pot longline gear are required to carry VMS (and logbooks) so spatial data for the fishery of greatest interest here should be relatively strong. The varying levels of spatial data quality across gear types makes it difficult to compare effort footprints in map form. It is also worth noting that State-waters fisheries are included in these figures. Furthermore, catch may also be attributed to a mixed target trip for sablefish and halibut. Therefore, these data could represent when a vessel fishes sablefish and then moves inside to harvest halibut in the same trip. Some of this sablefish gets attributed to areas where halibut was harvested. Comparing Figure 3-3 and Figure 3-4, HAL and pot harvest appear to have a similar fishery footprint during the first three years of the GOA sablefish IFQ pot fishery. However, there is a higher concentration of HAL catch in WY and SE, while pot catch is more prevalent in the CGOA and WGOA. Pot gear is representing more of the total IFQ sablefish catch outside of Dutch Harbor in Area 610 (WGOA), around the Seward Gully in 630, and off Chichagof Island in 650.

A comparison of Figure 3-4 and Figure 3-5 illustrates the increase in pot harvest in 2020, both in terms of sablefish harvest volume (comparing three years of data to one year with the same legend labels) and the spatial expansion of pot gear in each area. Figure 3-6 shows areas fished with sablefish pots, with a percentage of total sablefish catch by pot gear calculated for each unit of area. It appears that in areas with high pot gear activity, pot gear represents the largest percentage of catch. Further information from local knowledge holders may be able to indicate whether these are hotspots for whale depredation or these are just the traditional areas that vessels fished before pots, and those same vessels are transitioning to pot gear. For example if a vessel fished in grid X with HAL gear in 2017 and harvested 50 mt of catch but switched to pot gear and fished the same amount in 2018 and 2019, then the map would indicate 66% pot gear.

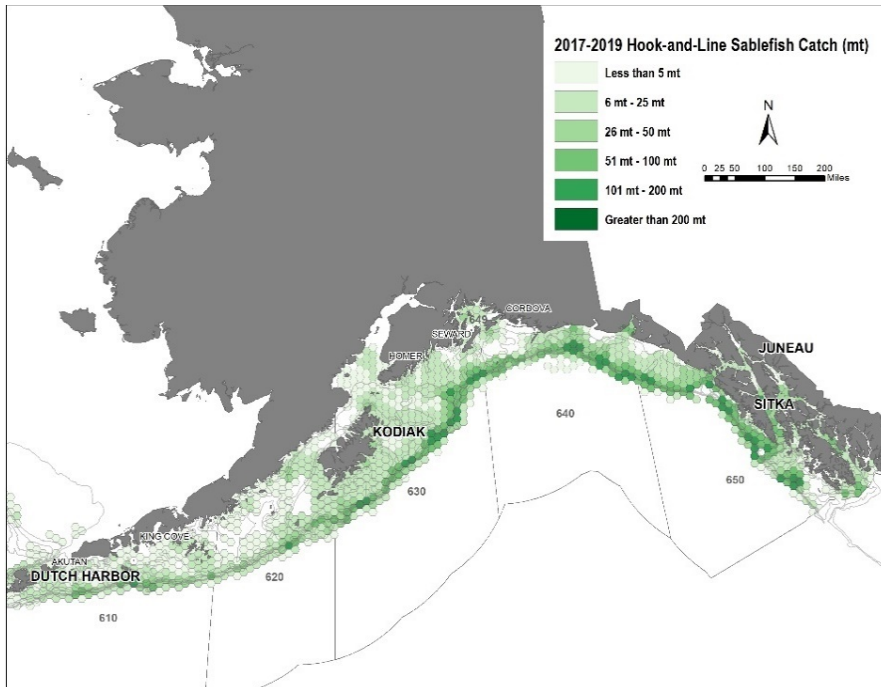


Figure 3-3 Spatial distribution of sablefish catch by HAL gear, 2017-2019
Source: NMFS Alaska Region Catch-in-Areas database. Note: State waters fisheries are included.

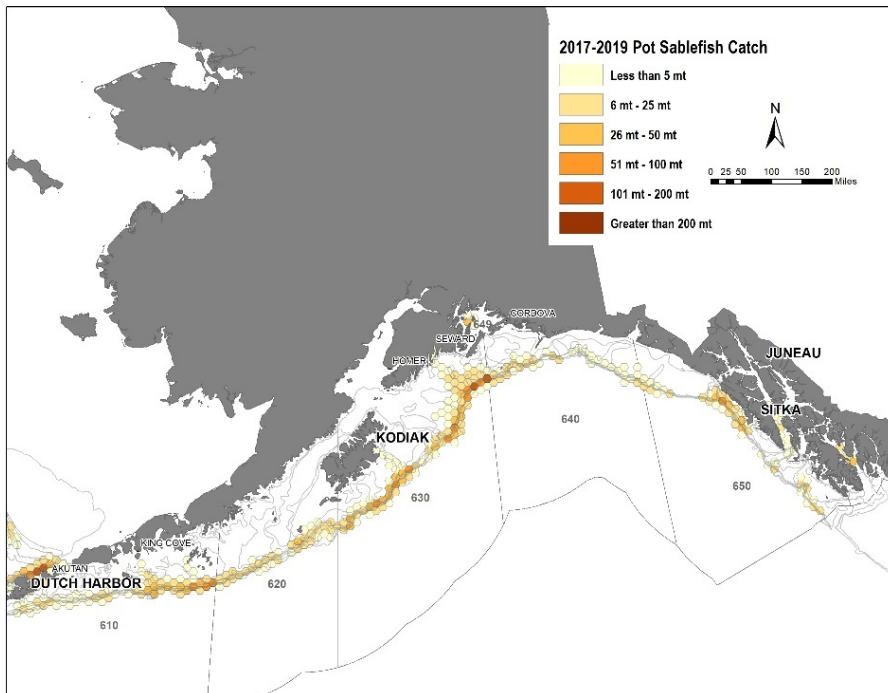


Figure 3-4 Spatial distribution sablefish catch by pot gear, 2017-2019
Source: NMFS Alaska Region Catch-in-Areas database.

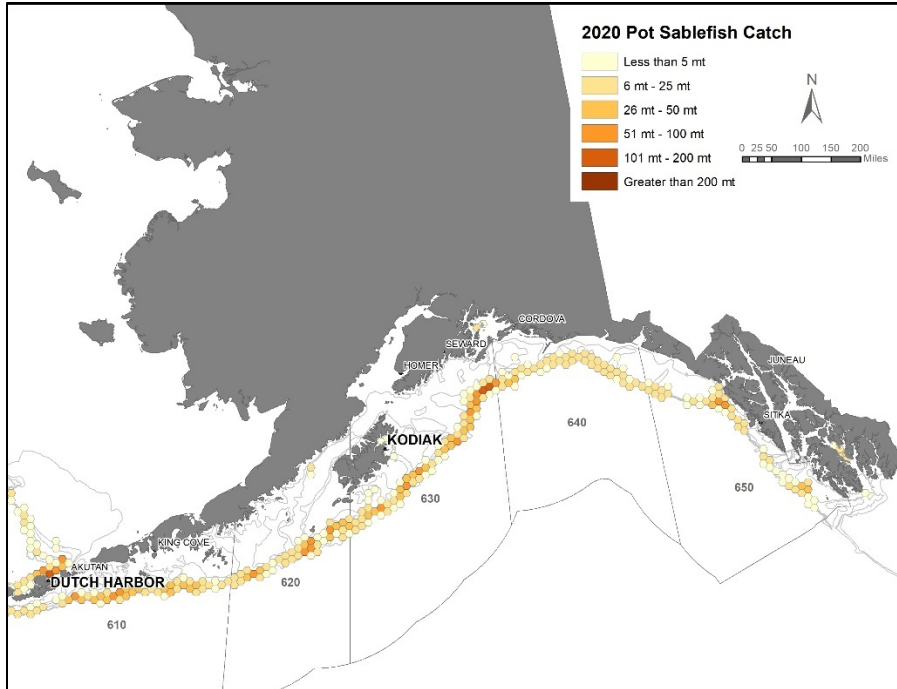


Figure 3-5 Spatial distribution of sablefish catch by pot gear, 2020

Source: NMFS Alaska Region Catch-in-Areas database

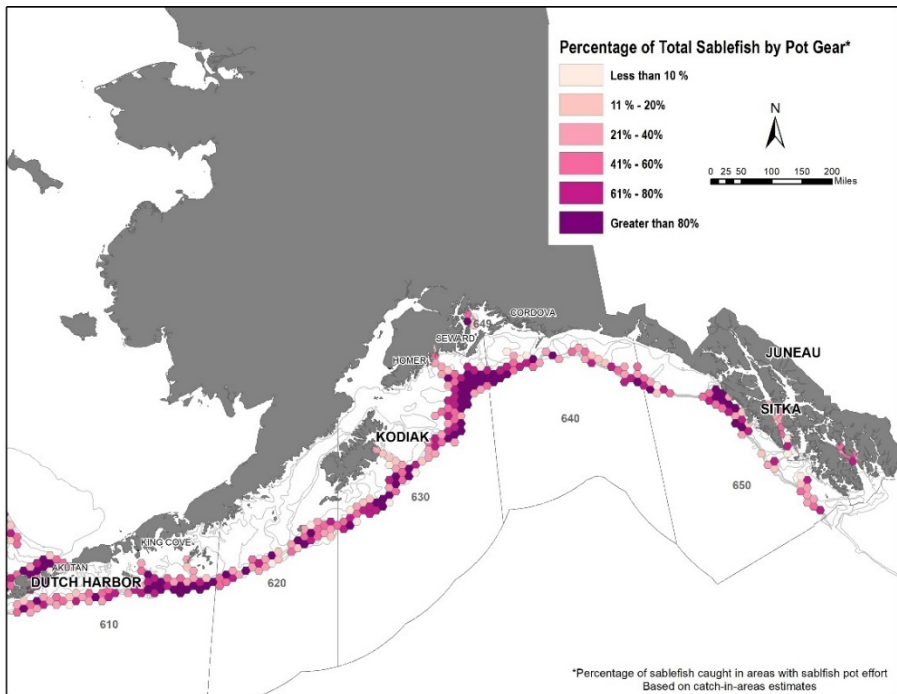


Figure 3-6 Percentage of total sablefish catch by pot gear, 2017-2019

Source: NMFS Alaska Region Catch-in-Areas database

3.2 Sablefish discards

Release of sablefish by the IFQ target fisheries (unless you only possess halibut IFQ) is currently prohibited by regulation. However, NMFS calculates at-sea discard rates for catcher vessels from

observer and EM data (and those discard rates are applied to sablefish landings and accrue to the fixed gear allocation of the TAC, but not to fishermen’s IFQ. Observer and EM data demonstrate that there have been instances of vessels fishing sablefish pots discarding sablefish (even though it is prohibited to discard IFQ sablefish). If there is an observer or EM on a pot CV when sablefish are discarded, then that data is included in the at-sea discard rate calculated and applied to unobserved pot CVs. Therefore, the large number of discards shown in 2019 includes the discard rate applied to other CVs that may not be discarding. This is not to suggest that there is necessarily this amount of discarding occurring in the sablefish pot fishery, however, it is the best data available.

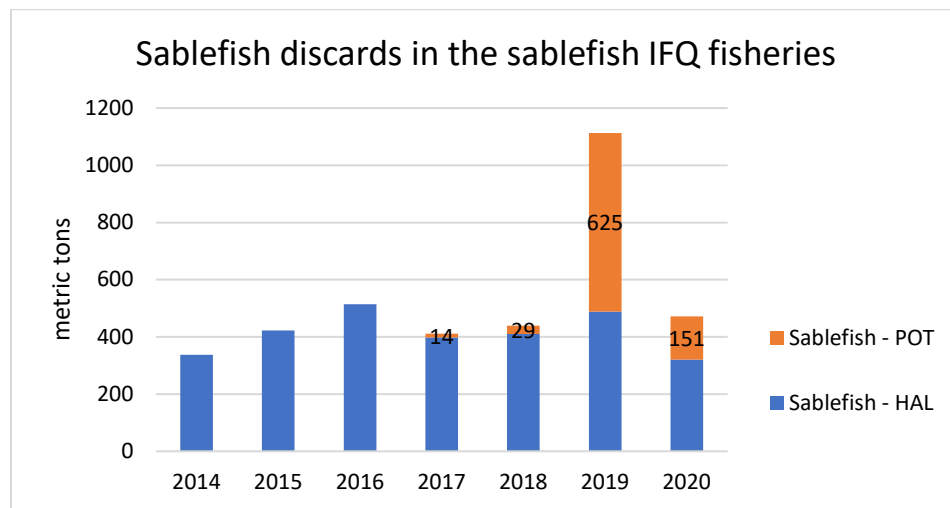


Figure 3-7 Sablefish discards in the sablefish IFQ fisheries
 Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN in Comprehensive_BLEND_CA

4 Incidental Catch in the Sablefish Pot Fishery

4.1 Groundfish, halibut, and crab

The environmental assessment for Amendment 101 predicted that allowing the use of pot longline gear would be expected to reduce bycatch of rockfish, sharks, skates and other groundfish species commonly caught as bycatch by vessels using HAL gear in the GOA sablefish IFQ fishery. Data from 2017-2020 (Figure 4-1) demonstrate this pattern of bycatch reduction over the first few years of the fishery. Bycatch, or incidental catch, in the GOA sablefish pot fishery is largely comprised of Pacific halibut – which are allowed to be commercially retained if the vessel has the necessary IFQ onboard – as well as arrowtooth flounder, grenadiers, and Pacific cod (Figure 4-2). Smaller amounts of rockfish, flatfish, sharks, and octopus are also caught in sablefish pot gear in the GOA. For context, as illustrated in Figure 4-1, sablefish constituted almost 96% of overall pot gear catch composition in 2020; all other species groups listed in Table 4-1 made up the remaining 4% of catch. Catch of tanner and king crab are excluded from that percentage since they must be discarded as PSC and are reported in number of crab, which is shown in Table 4-7.

As mentioned in Section 10, different tunnel designs/openings might affect catch-quality and bycatch distribution; the analysts currently have little or no information on *why* certain bycatch may be occurring or whether trends in bycatch can be attributed to the development of better gear or more experience with the new fishery. Testimony from participants has yielded some information. For example, several fishermen stated that they are fishing pots deeper than they would typically expect to find Pacific cod. This input has provided some insight into potential changes in the composition of incidental catch in the pot fishery but has not been collected in a systematic way. Furthermore, this review does not thoroughly investigate discard mortality rates (DMRs) of incidental catch in sablefish pots in the GOA.

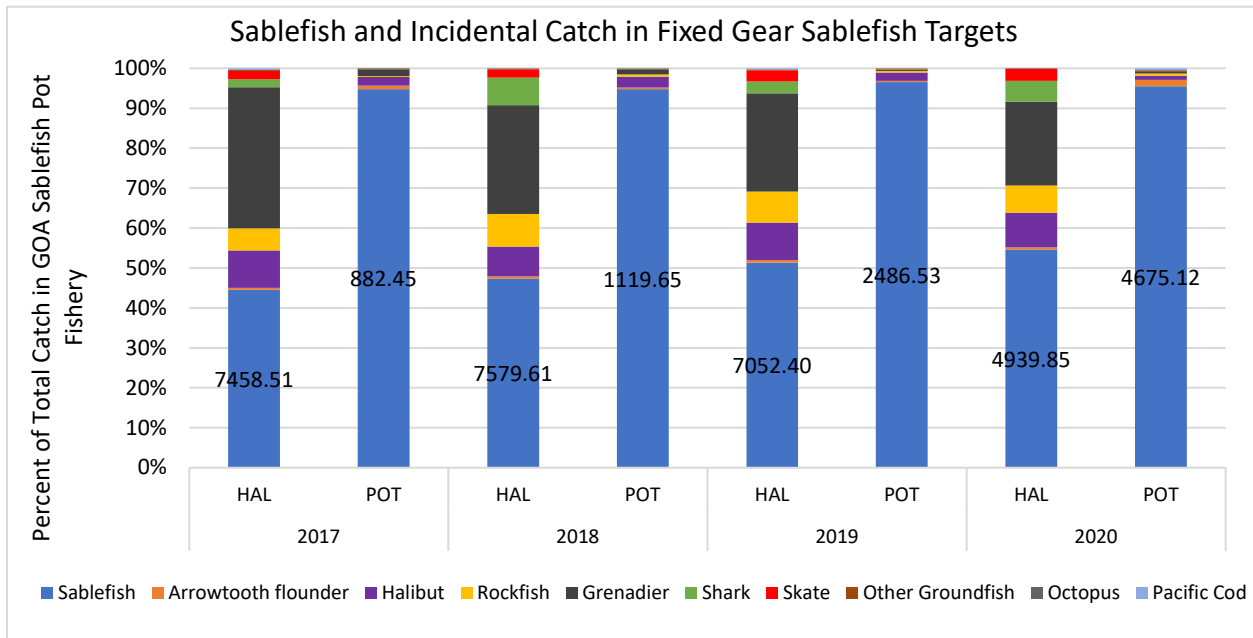


Figure 4-1 Sablefish and incidental catch in the sablefish HAL and pot gear, 2017-2020

Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN

The analysts have avoided averaging many of these data across years so as to not obscure annual changes in the composition of incidental catch while use of this gear type expands and the fishery develops. Data from 2020 may provide a more accurate estimate of catch composition in the sablefish pot fishery projecting into the future, as it reflects data after a few years of transition (when some participants have tuned their gear configurations and fishing strategies to the ways they find most effective). However, some of the changes in catch composition could also be due to changes in species abundance or distributions that are not accounted for here.

Table 4-2 provides one example of how the composition of incidental catch has varied over the first four years. Differences are particularly notable between 2019 and 2020. Data indicate an increase in arrowtooth flounder, from making up 9% of the incidental catch in 2019 to 35% in 2020, a decrease in halibut from 61% to 23%, and an increase in Pacific cod from 1% to 10% -- the latter trend may be linked to abundance. As shown in Table 4-3, many of the species groups that make up the majority of incidental catch are retained in the sablefish pot fishery rather than discarded.

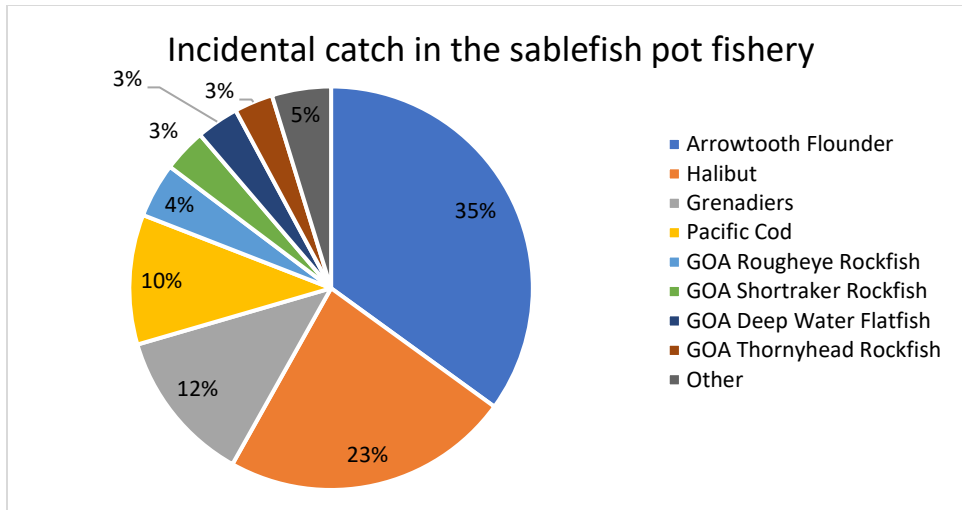


Figure 4-2 Incidental catch (non-sablefish, non-crab PSC) in the sablefish pot fishery, 2020
 Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN

Table 4-1 Species groups and amount caught in the sablefish pot fishery, 2020. These data include retained and discarded amounts, excluding crab PSC.

<i>Species group</i>	<i>weight (mt)</i>
Sablefish	4675.12
Arrowtooth Flounder	76.4
Halibut	50.5
Grenadiers	27.0
Pacific Cod	22.7
GOA Rougheye Rockfish	9.5
GOA Shortraker Rockfish	7.6
GOA Deep Water Flatfish	7.5
GOA Thornyhead Rockfish	6.8
GOA Shallow Water Flatfish	3.0
Other Rockfish	2.3
Octopus	2.1
Shark	1.1
Sculpin	0.6
GOA Skate, Longnose	0.3
Total	4893

Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN

Table 4-2 Percent of incidental catch (excludes crab PSC)

Species group	2017	2018	2019	2020
Arrowtooth Flounder	17%	7%	9%	35%
Halibut	41%	52%	61%	23%
Grenadier	32%	24%	11%	13%
Pacific Cod	0%	1%	1%	10%
GOA Rougheye Rockfish	2%	4%	4%	4%
GOA Shortraker Rockfish	1%	2%	4%	3%
GOA Deep Water Flatfish	4%	2%	1%	3%
GOA Thornyhead Rockfish	2%	2%	1%	3%
GOA Shallow Water Flatfish	0%	0%	1%	1%
Other Rockfish	0%	2%	1%	1%
Octopus	1%	1%	3%	1%
Shark	0%	1%	2%	0%
Total	100%	100%	100%	100%

Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN

Table 4-3 Percent retention of incidental catch in sablefish pots

Species group	2017	2018	2019	2020
Arrowtooth flounder	5%	0%	4%	0%
Halibut	82%	94%	70%	57%
Pacific Cod	52%	100%	96%	30%
GOA Rougheye Rockfish	63%	97%	89%	96%
GOA Shortraker Rockfish	43%	92%	70%	85%
GOA Deep Water Flatfish	0%	0%	0%	0%
GOA Thornyhead Rockfish	72%	60%	54%	88%
GOA Shallow Water Flatfish		42%		
Other Rockfish	100%	39%	50%	75%
Octopus	0%	0%	0%	1%
Shark	0%	0%	0%	0%

Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN

Halibut

During development of Amendment 101, it was noted that pots would catch fewer halibut; and even if the halibut mortality may be higher in pots, the overall mortality would be less than if discarding was required. Discard mortality rates for halibut in the GOA groundfish fisheries are 10% for pot gear and 13-15% for HAL CVs/CPs. The Sablefish Gear Committee (now disbanded) reported that the pot tunnel size likely would likely determine how much halibut bycatch occurs. Table 4-4 indicates that pot gear has consistently caught a smaller percent of halibut (roughly 1-3%) than HAL gear (roughly 7-9%) in the sablefish IFQ fisheries.

Table 4-4 Halibut as a percent of total catch in the GOA sablefish IFQ fisheries

	2017		2018		2019		2020	
	HAL	POT	HAL	POT	HAL	POT	HAL	POT
weight (mt)	1575	20	1182	32	1285	54	783	51
% of total catch	9%	2%	7%	3%	9%	2%	9%	1%

Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN

As part Amendment 101, legal-size (over 32 inch) halibut are required to be retained if sufficient halibut IFQ are held onboard the vessel. Therefore, some of the halibut caught in pots is retained rather than discarded as Prohibited Species Catch (PSC). The Council did not identify management measures to limit halibut IFQ retention to incidental amounts as part of Amendment 101. A smaller proportion of halibut is discarded in the sablefish pot fisheries than in the sablefish HAL fishery, which could either suggest that HAL IFQ is not as frequently held by sablefish harvesters using HAL gear, or pot gear is catching more halibut over 32" than HAL gear. While the percent of halibut retained has varied annually, between 57% and 94% of halibut caught in sablefish pots was retained over the past four years of fishery data (Table 4-5), as compared to 61-69% retained in the sablefish HAL fishery (Table 4-6).

Table 4-5 Halibut caught in sablefish pot fishery

Year	Discarded (mt)	Retained (mt)	Total (mt)	% Retained
2017	4	16	20	82%
2018	2	30	32	94%
2019	16	38	54	70%
2020	22	29	51	57%

Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN

Table 4-6 Halibut caught in sablefish hook-and-line fishery

Year	Discarded (mt)	Retained (mt)	Total (mt)	% Retained
2017	684	892	1575	57%
2018	446	736	1182	62%
2019	495	790	1285	61%
2020	244	539	783	69%

Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN

Crab

Any tanner, snow or king crab caught in GOA sablefish pots must be discarded as PSC. PSC are reported by number of animals in Table 4-7; only tanner (*Chionoecetes bairdi*) and golden king crab (GKCR) have been observed in the GOA sablefish pot fishery.

Table 4-7 Crab PSC in the GOA sablefish pot fishery, in numbers

YEAR	GEAR	BAIRDI	GKCR
2017	POT	0	0
2018	POT	48	0
2019	POT	200	92
2020	POT	98	39

Source: NMFS Alaska Region Catch Accounting System, data compiled by AKFIN

4.2 Seabird and marine mammal interactions

The Council and stakeholder committees have noted potential benefits of pot gear for sablefish fishing that include mitigation of marine mammal interactions and reduced incidental take of seabirds.

Pot gear remains the gear type with the least amount of estimated seabird bycatch, and no birds were estimated to have been taken as bycatch by pot gear in the GOA in 2019 (Krieger et al. 2019).

The Amendment 101 analysis explained that the action would lead to fewer disturbances and reduced likelihood of marine mammal entanglements. This was predicated on the assumption that if some portion of the sablefish IFQ fleet switches to pot gear, there will likely be decreased interactions between killer and sperm whales and the sablefish fishery (HAL).

The annual List of Fisheries (LOF) Summary lists U.S. commercial fisheries by categories according to the level of interactions that result in incidental mortality or serious injury of marine mammals. The 2021 LOF lists the GOA sablefish pot fishery in Category III- “remote likelihood of / no known interactions,” as there are no documented interactions of marine mammal species or stocks incidentally killed or injured in this fishery (NOAA Fisheries n.d.).

5 Fishery Revenues

This section is a data summary of GOA sablefish IFQ fishery revenues and ex-vessel unit values during the analyzed period, including years prior to the implementation of pot gear in 2017. The data presented are derived from ADF&G/CFEC Fish Tickets compiled by AKFIN; Fish Ticket data for 2020 are not yet available at the time of publication. Dollar values are reported as inflation-adjusted “real dollar” values with a base year of 2019. Fishery-level data include adjustments for end-of-year settlements, bonuses, and the like. For this report, these data are generally reported in terms of “net price,” which is calculated annually – by area, gear type, etc. – by taking the total value of the fishery at the ex-vessel level and dividing by the “net pounds” reported. “Net pounds” reflects the difference in whole pounds (unprocessed) and the weight of all the fishery products sold.⁵ Data on unit values at the grade-level come from a restricted dataset that excludes incomplete data submissions. Grade-level data can be more volatile on an annual basis because, in some cases, a small number of processors in a given area are submitting ex-vessel values at that level of granularity. Grade-level data reported by processors also include some sablefish that were retained in the GOA fixed-gear Pacific cod fishery; that likely accounts for a small portion of overall grade-level reporting but, nevertheless, is another difference from the data from which “net price” was calculated.

As a starting point of reference, Table 5-1 shows whole pounds, net pounds, and total fishery ex-vessel value (2019\$) for the GOA sablefish IFQ fishery (WGOA, CGOA, WY, and SE) from 2009 through 2019. Table 5-2 breaks out 2017 through 2019 by gear type (pot, HAL). During that period, net pounds were 83% of whole pounds. The lowest ratio was 81% in 2019 and the highest ratio was 85% in 2011. Recall that pot gear catch (whole pounds) jumped from 4.1 million lbs. in 2019 to 10.1 million lbs. in 2020, as shown in Table 3-1; final revenue break-outs for 2020 are not yet available.

⁵ For reference, the predominant first wholesale product is “eastern cut fillets” which account for 50% of total production. Eastern cut fillets represent a net weight of 63% of round weight (whole pounds). Reporting net price only in terms of eastern cut would inflate the value per whole pound delivered because it does not incorporate ancillary products or units that were marketed with less value added at the first wholesale stage.

Table 5-1 GOA sablefish IFQ catch volume (million lbs.) and ex-vessel value (million 2019\$)
 Shading indicates years during which fishing with pot vessels was authorized.

	Whole Pounds	Net Pounds	Ex-Vessel Value (2019\$)
2009	20.8	17.2	76.4
2010	19.4	16.1	83.2
2011	21.0	17.8	117.8
2012	24.0	19.8	106.7
2013	23.0	19.1	70.4
2014	19.8	16.5	74.0
2015	19.0	15.8	75.4
2016	16.8	13.8	73.7
2017	18.6	15.4	93.6
2018	19.4	15.9	70.5
2019	20.0	16.3	55.9
Total	221.8	183.8	897.6

Table 5-2 GOA sablefish IFQ catch volume (million lbs.) and ex-vessel value (million 2019\$) by gear type

	Whole Pounds		Net Pounds		Ex-Vessel Value (2019\$)	
	HAL	Pot	HAL	Pot	HAL	Pot
2017	16.7	1.9	13.7	1.7	85.1	8.5
2018	17.0	2.4	13.9	2.0	64.2	6.3
2019	15.9	4.1	12.9	3.4	46.9	9.0

Table 5-3 shows the ex-vessel price per pound based on Fish Tickets from 2014 through 2019, by gear type. GOA IFQ fishery-level data show that Fish Ticket value per pound was lower for pot gear during the first three years since implementation. Table 5-4 breaks out gross ex-vessel revenues and the average net price per pound by subarea within the GOA (2019\$). Comparing within the pot gear group, average prices were similar in the CGOA, WY and SE; prices were consistently the lowest in the WGOA. The price per pound in SE emerged slightly higher than the other areas in the two most recent years for which data are available. Nominal ex-vessel prices for sablefish in all areas have generally been on a decline since a peak around 2011, owing to a combination of demand-side market factors and fish size that are not fully explored in this data report (see also, Table 5-7, below). The most recent sablefish market profile published by the Alaska Fisheries Science Center can be found in Section 8.4 of the 2020 Economic Groundfish Status Report (“Economic SAFE”).⁶

⁶ Accessible at: <https://www.fisheries.noaa.gov/resource/data/2020-economic-status-groundfish-fisheries-alaska>

Table 5-3 GOA sablefish IFQ ex-vessel price per pound (2019\$) by gear type, based on whole weight (round weight) and net weight

	Whole Price		Net Price	
	HAL	Pot	HAL	Pot
2014	3.75		4.73	
2015	4.08		4.94	
2016	4.48		5.44	
2017	5.11	4.45	6.52	4.98
2018	3.75	2.81	4.82	3.21
2019	2.91	2.26	3.73	2.70

Table 5-4 GOA sablefish IFQ ex-vessel value (million 2019\$) and net weight price per pound (2019\$) by gear type and harvest area

Year		WG		CG		WY		SE	
		HAL	POT	HAL	POT	HAL	POT	HAL	POT
2014	Ex-Vessel \$ (mil)	9.27		31.14		12.00		21.62	
	\$/lb. (net)	5.86		4.76		4.48		3.81	
2015	Ex-Vessel \$ (mil)	8.02		31.62		12.99		22.80	
	\$/lb. (net)	6.27		5.06		4.80		4.11	
2016	Ex-Vessel \$ (mil)	8.90		30.45		12.08		22.30	
	\$/lb. (net)	6.79		5.57		5.28		4.66	
2017	Ex-Vessel \$ (mil)	8.84	1.93	33.96	4.22	14.88	0.93	27.43	1.39
	\$/lb. (net)	7.69	4.56	6.55	5.06	6.40	5.17	5.44	5.14
2018	Ex-Vessel \$ (mil)	5.76	1.66	23.06	3.19	12.62	0.25	22.75	1.19
	\$/lb. (net)	5.40	2.66	4.82	3.12	4.90	3.31	4.16	3.74
2019	Ex-Vessel \$ (mil)	4.12	1.62	14.11	5.22	9.19	0.74	19.50	1.40
	\$/lb. (net)	4.00	2.42	3.40	2.64	3.87	2.67	3.65	3.08

The following figure and tables provide information about fixed-gear sablefish ex-vessel values by the market category – i.e., the size of the fish delivered to shoreside processors. These data are derived from ADF&G Fish Tickets provided by AKFIN. Information about 2020 prices is taken from in-season Fish Tickets, which do not include end-of-year price adjustments that AKFIN would typically report (queried mid-December, 2020). Fully settled Fish Ticket data from CFEC does not become available to AKFIN until later in 2021. The catch volume and market-category price estimates below draw only from fish in head-and-gut form; H&G is the predominant sablefish form on Fish Tickets but does not cover 100% of fish delivered. Finally, market-category data are not available with a “management program code” appended but it is collected at the processor level mean that the analysts can select only for fish caught in the GOA, by gear type. This limitation means that a relatively small portion of the GOA sablefish captured in this data query were retained on GOA fixed-gear trips that were targeting the limited access Pacific cod fishery.

Figure 5-1 reports the percentage breakdown of GOA fixed-gear sablefish by gear type and market category. The data reflect that HAL gear may be selecting for larger fish on average, but it is notable that the proportion of larger size categories in pot gear catch are increasing as participants appear to be gaining experience in the fishery. Section 7.3 of this document provides evidence of the size selectivity of pot and HAL gear for sablefish. While data on size selectivity are limited, the difference in size selectivity between the two gear types may be narrowing since pot gear was first deployed in the GOA in 2017. Of the data used in this query, the volume of catch by pot gear (weight) increased 61% year-on-year from 2019 to 2020 while the volume caught with HAL gear decreased 60%. Table 5-5 reports the percentage

values of catch volume by market category – shown in Figure 5-1 – from 2017 through 2020, noting the data caveats described above.

Table 5-6 reports the average nominal ex-vessel price/lb. reported on Fish Tickets for fixed-gear catch. AKFIN applies state-wide average prices, meaning that some market-grade price datapoints are coming from processors buying BS or AI fixed-gear sablefish. The number of processors who purchase BS/AI fixed-gear sablefish and submit data that are usable for this query is small – small enough to be confidential in some years. Thus, the analysts believe these data are as reflective of the GOA IFQ fishery as possible. Because the 2020 values presented are drawn from in-season Fish Tickets, the analysts expect that those values are slightly understated, but the amount by which is not known due to the uniqueness of 2020 markets and how that might affect bonuses and settlements. The most notable trend is that 2020 marks the first year – even without complete Fish Ticket data – that per-unit ex-vessel prices for pot gear are beginning to surpass prices for HAL gear at the market-category level.

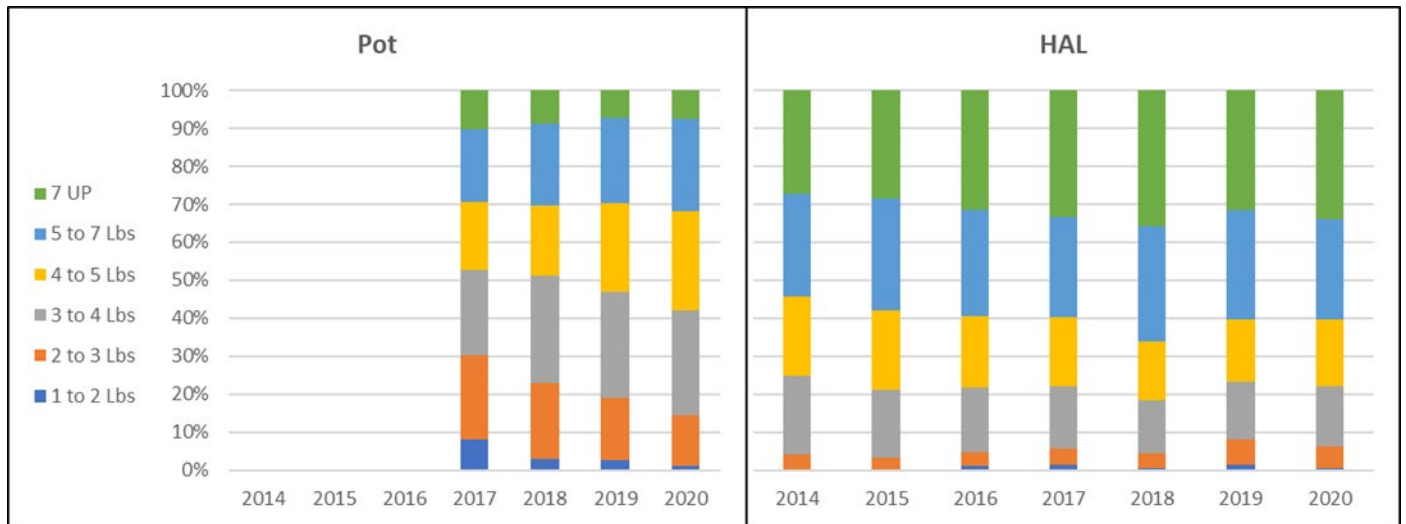


Figure 5-1 Percent landed weight of GOA fixed-gear sablefish (H&G), by gear type and market category (2014 through 2020)

Note: “Pot gear” panel intentionally excludes all data prior to 2017 for simplicity. Some GOA pot-caught sablefish was reported by market grade prior to 2017 (retained on fixed-gear trips targeting other groundfish). That type of catch is included in the data shown for 2017 through 2020.

Table 5-5 Percent landed weight of GOA fixed-gear sablefish (H&G), by gear type and market category (2017 through 2020)

	2017	2018	2019	2020
Pot				
1 to 2 Lbs	8%	3%	3%	1%
2 to 3 Lbs	22%	20%	16%	13%
3 to 4 Lbs	22%	28%	28%	28%
4 to 5 Lbs	18%	19%	24%	26%
5 to 7 Lbs	19%	21%	22%	24%
7 UP	10%	9%	7%	8%
HAL				
1 to 2 Lbs	1%	0%	2%	0%
2 to 3 Lbs	4%	4%	7%	6%
3 to 4 Lbs	16%	14%	15%	16%
4 to 5 Lbs	18%	15%	17%	18%
5 to 7 Lbs	26%	30%	29%	27%
7 UP	33%	36%	32%	34%

Table 5-6 Estimated ex-vessel price per pound for fixed-gear H&G sablefish by gear type and market category (2017 through 2020); AKFIN statewide estimates of market category price applied to GOA sablefish landings; 2020 prices do not represent finalized CFEC Fish Ticket data

	2017	2018	2019	2020
Pot				
1 to 2 Lbs	3.56	1.34	1.20	0.38
2 to 3 Lbs	4.39	2.03	1.76	1.07
3 to 4 Lbs	5.27	3.05	2.35	1.48
4 to 5 Lbs	5.98	3.77	3.05	1.82
5 to 7 Lbs	6.69	5.74	4.72	2.77
7 UP	7.88	6.23	5.05	4.14
HAL				
1 to 2 Lbs	4.84	1.34	1.35	0.38
2 to 3 Lbs	5.27	2.69	2.17	1.03
3 to 4 Lbs	6.28	3.79	2.59	1.45
4 to 5 Lbs	7.16	4.74	3.12	1.63
5 to 7 Lbs	8.21	7.48	4.93	2.51
7 UP	9.34	8.29	5.62	3.83

Section 2.2 of this document summarized the port communities where GOA sablefish IFQ catch has been landed, including breakouts for pot gear in particular. The remainder of this section supplements that information with total ex-vessel revenues at the port area level and port rankings. Rankings are used rather than the amount of gross ex-vessel payments to preserve confidentiality in communities where fewer than three shorebased processors participated in the fishery. The data in the tables include activity by shore-based facilities and inshore floating processors. In these tables, “Southeast” includes both the SE and WY management subareas. Table 5-7 and Table 5-8 report the total ex-vessel value of GOA sablefish IFQ deliveries and pot gear deliveries, respectively. The tables reflect the predominance of the CGOA as the area where the most sablefish IFQ pot gear catch is occurring, at least through 2019. Table 2-9 indicates that this trend extended to 2020 as Kodiak and Seward collectively account for over half of pot gear deliveries.

Table 5-7 Ex-vessel value (2019\$) of GOA sablefish IFQ by location of shoreside processing community, all gears

Port Area	2011	2012	2013	2014	2015	2016	2017	2018	2019	Annual Average 2011-2019 (\$ millions)	Annual Average 2011-2019 (percent)
BSAI	\$1.95	*	\$1.12	*	*	*	*	*	\$1.18	\$1.62	2.11%
Western Gulf	\$8.49	*	\$5.95	*	*	*	*	*	\$3.24	\$5.34	6.94%
Central Gulf	\$54.27	\$48.07	\$32.57	\$35.53	\$35.99	\$36.99	\$44.64	\$31.03	\$21.43	\$37.84	49.13%
Southeast	\$46.75	\$41.79	\$26.78	\$27.41	\$29.23	\$27.88	\$35.70	\$30.16	\$25.86	\$32.40	42.06%
Grand Total	\$110.64	\$98.39	\$65.98	\$69.80	\$71.22	\$69.86	\$88.73	\$66.84	\$51.70	\$77.02	100.00%

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT

Table 5-8 Ex-vessel value (2019\$) of GOA sablefish IFQ by location of shoreside processing community, pot gear

Port Area	2017	2018	2019	Annual Average 2017-2019 (\$ millions)	Annual Average 2017-2019 (percent of total IFQ)
BSAI	*	*	*	\$0.33	0.43%
Western Gulf	*	*	*	\$1.30	1.68%
Central Gulf	\$5.17	\$3.68	\$6.19	\$5.01	6.51%
Southeast	\$1.28	\$1.12	\$1.42	\$1.28	1.66%
Grand Total	\$8.48	\$6.29	\$8.97	\$7.91	10.28%

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT

Table 5-9 reports the number of shore-based processors (SBPR) that participate in the GOA sablefish IFQ fishery for all gears and Table 5-10 narrows the scope to those that take deliveries of pot-caught GOA sablefish IFQ. The right-hand column in Table 5-9 indicates that GOA sablefish IFQ accounts for roughly 10% of total ex-vessel payments made by these processors from 2011 through 2019. If the total ex-vessel payments by *all* processors in the communities where GOA sablefish IFQ processor occurs are considered then the values in the right hand column are reduced, indicated that there are facilities in these communities that are not engaged in this fishery. Overall, the percentage of ex-vessel value of this fishery, considering ex-vessel payments from all facilities, drops to 6.4% with the most notable decrease occurring in the Southeast port area (14.7% reduced to 7.5%). Table 5-10 shows that the facilities processing pot-caught GOA sablefish IFQ deliveries is a subset, and that pot catch accounts for a small percentage of total ex-vessel payments. Considering the upward trend in 2020 pot participation shown throughout this report, an assessment of engagement in the GOA sablefish IFQ pot fishery would greatly benefit from the Fish Ticket information that will be available later in 2020.

Table 5-9 Shore-based processor participation in the GOA sablefish IFQ fishery, GOA sablefish IFQ ex-vessel payments, total payments by those processors, and the percentage of total payments attributed to the GOA sablefish IFQ fishery (2019\$), 2011 through 2019

Port Area	Annual Average	SBPRs Annual	SBPRs Annual		Ex-Vessel Values Paid
	Number of Sablefish IFQ SBPRs 2011-2019	Average Ex-vessel Values Paid for Sablefish IFQ Only 2011-2019 (\$ millions)	Average Total Ex-vessel Values Paid for All Area, Gear, and Species Fisheries 2011	Average Total Ex-vessel Values Paid for All Area, Gear, and Species Fisheries 2019 (\$ millions)	for Sablefish IFQ as a Percentage of Total Ex-vessel Values Paid Annual Average 2011-2019
BSAI	2.4	\$1.62	\$217.77		0.7%
Central Gulf	13.3	\$37.84	\$235.94		16.0%
Southeast	16.2	\$32.40	\$221.01		14.7%
Western Gulf	3.0	\$5.34	\$90.67		5.9%
Grand Total	34.9	\$77.02	\$765.39		10.1%

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT

Table 5-10 Shore-based processor participation in the GOA sablefish pot gear IFQ fishery, GOA sablefish pot gear IFQ ex-vessel payments, total payments by those processors, and the percentage of total payments attributed to the GOA sablefish IFQ fishery (2019\$), 2017 through 2019

Port Area	Annual Average	SBPRs Annual	SBPRs Annual		Ex-Vessel Values Paid
	Number of Sablefish IFQ Pot SBPRs 2017-2019	Average Ex-vessel Values Paid for Sablefish Pot IFQ Only 2017-2019 (\$ millions)	Average Total Ex-vessel Values Paid for All Area, Gear, and Species Fisheries 2017	Average Total Ex-vessel Values Paid for All Area, Gear, and Species Fisheries 2019 (\$ millions)	for Sablefish Pot IFQ as a Percentage of Total Ex-vessel Values Paid Annual Average 2017-2019
BSAI	2.4	\$3.33	\$191.28		0.2%
Central Gulf	7.3	\$5.01	\$146.09		3.4%
Southeast	9.7	\$1.28	\$138.58		0.9%
Western Gulf	3.0	\$1.30	\$73.86		1.8%
Grand Total	22.4	\$7.91	\$549.81		1.4%

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT

From 2017 through 2019 in aggregate, the top seven processing communities in terms of ex-vessel value paid for pot-caught GOA sablefish IFQ are Akutan, Kodiak, Unalaska/Dutch Harbor, Seward, King Cove, Sitka, and Petersburg. The analysts ranked to seven due to a drop-off in total ex-vessel payments after that point, but it should be noted that seven of the eight remaining ports are located in the SE/WY region, meaning that processing participation in that region is somewhat more broad-based. As noted before, a ranking that includes 2020 data will be more informative. The 2019 ranking, when pot catch had begun to increase, featured the same top-seven but with Unalaska/Dutch Harbor, Kodiak, Akutan, Seward, and Sitka at the top. The same top-seven are ranked when considering both pot and HAL catch of GOA sablefish IFQ, but with Kodiak typically leading Akutan and Unalaska/Dutch Harbor in the top-three.

6 Observer Program and Electronic Monitoring

The GOA sablefish IFQ fishery is monitored as part of the North Pacific Observer Program (Observer Program). The Observer Program provides the regulatory framework for NOAA Fisheries certified observers to collect data on groundfish and halibut fisheries. The information collected by observers provides the best scientific information to manage the fisheries and to develop measures to minimize bycatch. Observers collect biological samples and fishery-dependent information on total catch and interactions with protected species. Managers use data collected by observers to monitor quotas, manage groundfish and prohibited species catch, and document and reduce fishery interactions with protected

resources. Staff at NMFS Fishery Monitoring and Analysis division (FMA) process data and make it available to the Sustainable Fisheries division of the Alaska Regional Office (AKRO) for quota monitoring, to scientists at the Alaska Fisheries Science Center (AFSC) for stock assessment, ecosystem investigations, and an array of research investigations, as well as the fishing industry itself.

The Observer Program is implemented by regulations at subpart E of 50 CFR part 679 which authorize the deployment of observers and electronic monitoring (EM) to collect the information necessary for conservation and management. The Observer Program is summarized with links provided to additional resources for fishermen, processors, and observers at <https://www.fisheries.noaa.gov/alaska/fisheries-observers/north-pacific-observer-program>.

Vessels operating in the partial coverage category are currently selected to carry an observer on a trip-by-trip basis. The operator of a vessel who intends to take a trip must log the trip beforehand in the NMFS Observer Deploy and Declare System (ODDS). The likelihood of being selected to carry an observer on the trip or have the trip monitored by an EM system is determined by the selection probabilities established each year through the Observer Program's Annual Deployment Plan (ADP). The Observer Program is comprised of three selection pools: (1) No Selection; (2) EM Trip Selection; and (3) Observer Trip Selection. As relates to this fishery, the No Selection pool applies to HAL or pot gear vessels that are less than 40' LOA. HAL or pot gear vessels in the EM Trip Selection pool must remain in that pool for the duration of the calendar year and each fishing trip must be logged into ODDS. EM vessels must also comply with other requirements as defined by their NMFS-approved individual EM vessel monitoring plan (VMP). HAL or pot gear CVs that are greater than or equal to 40' LOA and are not in the EM pool are in the Observer Trip Selection pool. Each fishing trip must be logged into ODDS at least 72 hours before the anticipated departure and must carry an observer if the trip is selected.

CP vessels, including those participating in the IFQ Program, are typically subject to full observer coverage per § 679.51(a)(2). A limited exception exists for CP vessels whose operators request placement in the partial coverage category. Such a vessel would need to request that NMFS place it in partial coverage for the following year by July 1 and would need to have had an average weekly groundfish processing production of less than 79,000 lbs. (35.8 mt) in the year preceding the request. Upon successful request, the vessel is subject to partial observer coverage for all fishing activity except when participating in a Limited Access Privilege Program (LAPP) that requires additional observer coverage as described at § 679.51(a)(2)(iv). As reflected in Table 6-1, FMA data show that from 2017 through 2020 there were 25 GOA sablefish IFQ trips attributed to CPs in partial coverage; all were by vessels using HAL gear and none were selected for observer coverage. By contrast, GOA sablefish IFQ CPs in the full coverage category recorded 35 trips during the same period – 30 by vessels using HAL gear and five by vessels using pot gear.

Table 6-1 CP trips by observer coverage category, by year (2017 through 2020); Source: NMFS FMA

Coverage			
Category	Gear	Year	Trips
Full	HAL	2017	7
		2018	10
		2019	9
		2020	4
	Pot	2020	5
Subtotal			35
Partial	HAL	2017	3
		2018	5
		2019	8
		2020	9
	Subtotal		

Two parts of the GOA sablefish IFQ fishery have not been subject to observer coverage during the 2017 through 2020 period: vessels that were participating in EM research during the 2017 “pre-implementation year – during which EM catch was monitored but was not incorporated into the NMFS Catch Accounting System – and fixed-gear vessels that were in the No Selection pool by virtue of being less than 40’ LOA. In 2017, the EM pre-implementation observer selection stratum totaled 215 sablefish trips by vessels using HAL gear and 18 trips by vessels using pot gear (Table 6-2). The No Selection pool totaled 274 sablefish trips from 2017 through 2020; 266 trips used HAL gear and eight used pot gear. By year, from 2017 through 2020, the number of No Selection pool trips using HAL gear fell progressively from 84 to 44. All eight pot gear trips in the No Selection pool occurred in 2020, reflecting the increased adoption of pot gear by smaller vessels (Figure 2-1).

Table 6-2 summarizes the total number of trips in each observer stratum from 2017 through 2020 as well as the proportion of trips that were selected for observer or EM coverage and the proportion of total GOA sablefish IFQ landed within that stratum on selected trips. The table reflects how the Observer Program stratifies trip selection for observer or EM coverage. HAL and POT indicate trips eligible to be selected to carry a human observer. EM_HAL and EM_POT indicate trips by vessels within the EM selection pool for a given year, beginning in 2018 when EM was fully integrated in the monitoring plan for catch accounting purposes. The No Selection category mainly includes fixed-gear vessels of less than 40’ LOA, but 2017 data also include EM research during the pre-implementation year. For 2020, relative to the previous years, POT and EM_POT trips trended upwards relative to HAL. Readers of this report should bear in mind that the trip selection probability for a given stratum varies annually as prescribed by the Observer Program’s ADP, which is reviewed by the SSC and the Council. Additionally, impacts from the COVID-19 pandemic significantly reduced the agency’s capacity to deploy observers; emergency waivers were issued for the partial coverage observer program during March-July except for vessels departing from Kodiak. The ADP essentially allocates coverage – vis-à-vis selection probability – to each stratum in order to get the best possible sample of fishing effort across area and gear groups within the constraints of financial and human resources which, themselves, vary annually. During the 2017 to 2020 period, 88 EM vessels fished with HAL gear (1,049 trips) and 29 EM vessels fished with pot gear (258 trips). The proportion of trips monitored with EM was 24% for HAL and 26% for pot gear. The median number of trips per EM vessel was 10 for HAL and six for pot gear.⁷

⁷ Though not as relevant to this report because the data are not broken out by HAL/pot gear use, NMFS FMA staff took the opportunity to provide ranked home ports and landing ports for EM vessels (2017-2020). By vessel count, in

Figure 6-1 and Figure 6-2 use the monitoring context to illustrate the progression of GOA sablefish IFQ pot gear adoption in general, and the 2020 expansion into the smaller-LOA vessel group in particular. In both figures, each “dot” represents a vessel. The number superimposed on each distribution plot is a count of vessels in that year/gear/stratum grouping. The width of the distribution outline reflects the relative proportion of vessels around that rank on the percentile scale. The horizontal line indicates the median (50th percentile vessel-rank). The figures show that pot gear use markedly expanded in 2020 and that smaller vessels are adopting pot gear. Within the pot gear group, EM adoption was on the rise in 2020 but that cannot be established as a trend without seeing 2021 data and additional years.

Table 6-2 GOA sablefish IFQ trips observed and percent of total GOA sablefish IFQ catch observed by Observer Program stratum and year, 2017 through 2020; Source: NMFS FMA

STRATA	Year	Trips Total	Trips Observed	% Trips Observed	% Sabl. Lbs. Landed on Observed Trips
HAL	2017	859	99	12%	12%
	2018	830	106	13%	11%
	2019	750	123	16%	15%
	2020	656	40	6%	6%
HAL Total		3,095	368		
EM_HAL	2018	371	62	17%	19%
	2019	395	127	32%	28%
	2020	283	63	22%	25%
EM_HAL Total		1,049	252		
POT	2017	136	10	7%	7%
	2018	131	23	18%	13%
	2019	130	15	12%	9%
	2020	308	25	8%	9%
POT Total		705	73		
EM_POT	2018	45	7	16%	9%
	2019	69	25	36%	29%
	2020	144	35	24%	19%
EM_POT Total		258	67		
No Selection	HAL 2017*	299			
	2018	79			
	2019	59			
	2020	44			
	POT 2017**	18			
	2020	8			

Note: Mixed-gear trips are all reported under STRATA = HAL or EM_HAL; see Table 6-3

* Includes No Selection (84) and EM Research (215)

** EM Research

descending order, the top-five EM vessel home ports were Sitka, Homer, Petersburg, Juneau, and Kodiak. The top-five landing ports were Sitka, Kodiak, Seward, Petersburg, and Juneau.

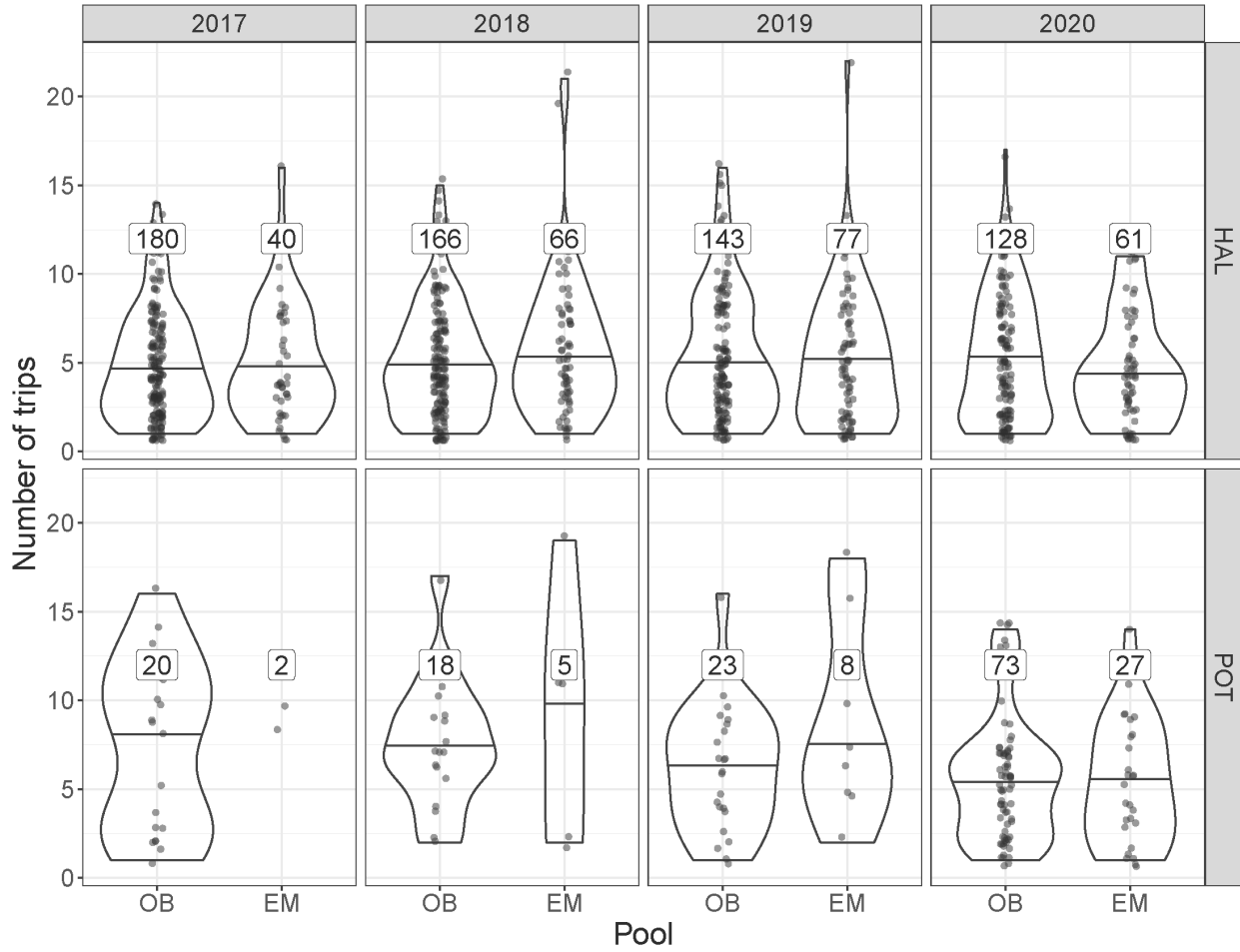


Figure 6-1 Distribution of vessels by trip-count, grouped by gear type and monitoring stratum, 2017 through 2020; Source: NMFS FMA

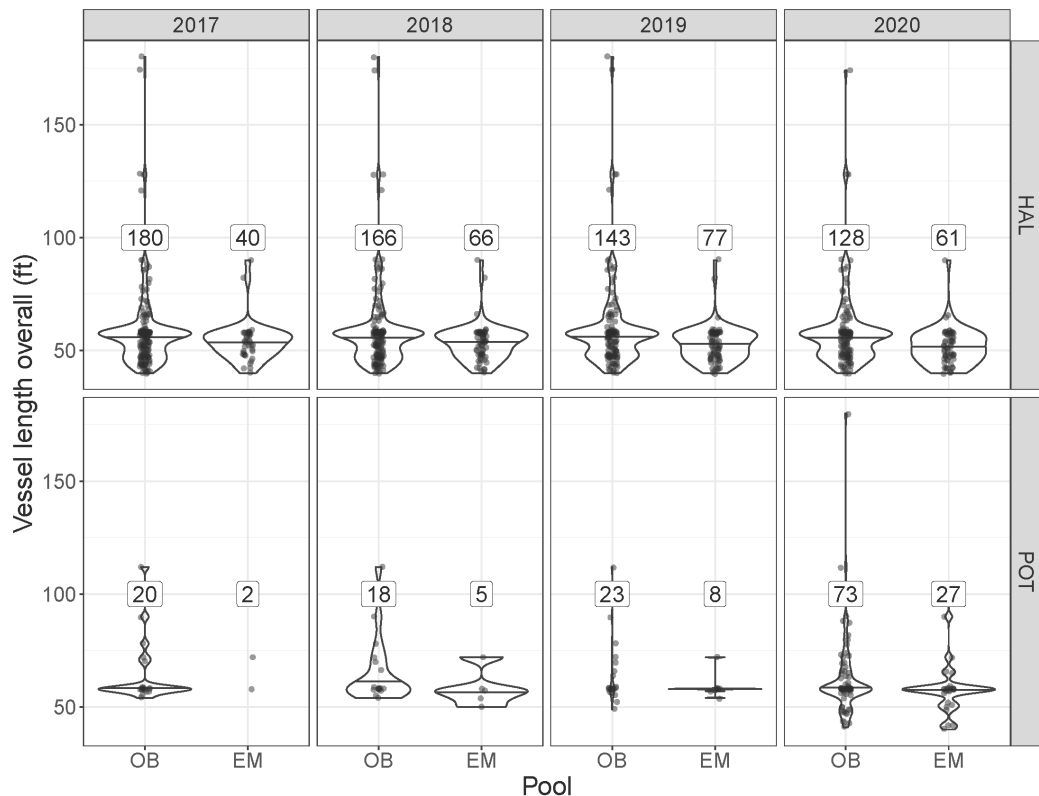


Figure 6-2 Distribution of vessels by size, grouped by gear type and monitoring stratum, 2017 through 2020; Source: NMFS FMA

Vessels targeting IFQ species are permitted to use both pot and HAL gear on the same trip, but not the same set, as this would create sampling issues. A vessel that intends to do a mixed-gear trip would indicate the predominant gear type that they will use when they initially log the trip into ODDS. The selection rate associated with that self-reported predominant gear type is then used in random observer selection. Table 6-3 reports the number of GOA sablefish IFQ trips where both pot and HAL gear were utilized, from 2017 through 2020. The number of mixed gear sablefish IFQ trips increased significantly in 2020 from 15 or fewer to 131. The analysts speculate that the increase in mixed-gear trips is attributed to a combination of more total vessels using pot gear and the increased adoption of lightweight, collapsible pot styles that allow vessels to stow pots on deck with less impact on vessel carrying capacity (see Section 8). Catch by gear type is recorded both on observed trips and on unobserved trips via fish tickets and may be segregated or flagged for reporting and landing purposes. The estimation for discards is done by aggregating the gear-specific haul information (from observed trips) to get a bycatch rate (that is specific to a gear type) that is applied to the landing amounts reported on the fish ticket (by gear).

Table 6-3 Number of GOA sablefish IFQ trips where both pot and HAL gear were deployed, 2017 through 2020; Source: NMFS FMA

Year	Partial Cov. Pool	HAL/Pot Mixed Trip	%Total Trips
2017	Observer	11	1.1%
2018	Observer	5	0.5%
	EM	0	0.0%
2019	Observer	12	1.4%
	EM	3	0.7%
2020	Observer	93	9.6%
	EM	38	9.8%

Vessels participating in EM and using pot gear require a different camera placement than on a longline vessel, specifically a camera that can view the sorting table. In most cases an additional camera is required to allow the vessels to participate in both fisheries. Catch handling requirements for EM vessels using pot gear is also different than catch handling on a longline EM vessel. Compliance with the catch handling requirements for EM vessels using pot gear are a common compliance issue. These issues are more common because these catch handling requirements typically require a vessel to change their normal operation to enable enumeration of the catch on the sorting table. The catch handling requirements in the VMP for pot vessels are as follows:

- Deployment of pot and hook/line gear in the same set is prohibited.
- All catch must be handled within view of the cameras
- On retrieval of a pot, ALL catch must be emptied from the pot onto the sorting table. Any catch left in the pot or that land on the deck must be placed on the sorting table.
- Process all retained catch and leave discards on the sorting table until after the retained catch are placed in the fish hold.
- If there is no sorting table, all catch must be sorted in view of the cameras and discards left on deck in view of camera after retained fish are placed in the fish hold.
- Completely clear all catch, especially Pacific cod, off the table and deck before the next pot is dumped (so that catch from 2 pots is not mixed).
- If the entire table is covered with catch, then fish should be cleared from the table a few at a time to allow EM reviewer to count the retained catch).

The ease with which slinky pots can be integrated on traditional hook-and-line vessels provided the flexibility for vessel operators to use pot gear and several vessels integrated pots into their fishing; however, those vessels did not have a VMP approved for pot gear. This required some education and outreach. VMPs are written to be specific to gear type and the vessel must have an approved VMP for pot gear before they can deploy pots. In order to address some of the confusion, new protocols were developed with EM service providers to ask vessel operators if they are considering expansion into pot gear. If the vessel operator indicates that may be likely, the EM service provider recommends a camera placement and VMP approved for both longline and pot use. This enables the EM service provider an opportunity to educate the vessel operator on the catch handling difference in order to reduce future VMP compliance issues.

Some vessel operators started integrating slinky pots within their longline sets. Vessel operators indicated that they were testing the gear for efficacy before shifting more to pots for sablefish in order to reduce whale depredation and bycatch. Sampling for HAL gear and pots are different and the mixture of two gears in a single set creates sampling challenges. Due to the increase in this practice and the impact it has on the collection of data, VMPs were modified in 2021 to restrict the use of two gear types in a single set.

FMA staff noted to the analysts that pot longline gear is not the same as single-pot gear in terms of monitoring protocols. Pot gear data collection protocols for EM and human observers were never tested side-by-side for comparative purposes, which was a marked difference from HAL protocols. As described above, pots have introduced new challenges for EM reviewers and a need to have different VMP designs.

7 Stock assessment considerations

7.1 Whale depredation estimation

GOA Amendment 101 and the development of a sablefish pot fishery was initiated in response to whale depredation occurring in the sablefish HAL fishery. Depredation of sablefish off of HAL gear by killer

whales and sperm whales has presented an emerging challenge for stock assessment authors in recent years, and authors have evaluated the impact depredation in the fishery may have on the annual sablefish assessment. For reporting and stock assessment purposes, whale depredation is defined as whales being present during haulback with the occurrence of damaged fish in the catch.

For the final recommended Acceptable Biological Catch (ABC), sperm and killer whale depredation are accounted for in the longline survey and in the longline fishery. Two studies (one for the fishery and one for the survey) that provide estimates and methods for these adjustments are published in Peterson and Hanselman 2017 and Hanselman et al. 2018. For specific details on the generalized linear mixed model approach used starting in 2016 for whale depredation estimation methods, we refer the reader to the Whale Depredation Estimation section of the sablefish stock assessment (Goethel et al. 2020).

Sets on the AFSC longline survey impacted by killer whale depredation have always been removed from calculations because of the significant and variable impacts killer whales can have on catch rates. However, sperm whale depredation is more difficult to detect and prior to 2016 no corrections were made to account for sperm whale removals. Since 2016, one year before pots became a legal gear type for GOA sablefish, the assessment has made corrections for sperm whale depredation following methods detailed in Hanselman et al. (2018). Sablefish survey catch rate deductions due to sperm whale depredation range from 12-18%. The overall increase to survey relative population numbers (RPN) ranges from 1-5% because sperm whale depredation only occurs on a subset of total survey stations.

Inflating survey estimates of abundance (from the longline survey) in the sablefish assessment due to depredation requires simultaneously adjusting the catch in the commercial HAL fishery upwards to similarly account for depredation; otherwise, the ABC would be overly optimistic if only abundance was increased due to survey depredation without also accounting for increased removals in the fishery due to depredation. To do this, HAL fishery CPUE data from “good performance” sets is compared to sets with “considerable whale depredation” as recorded by observers for both killer and sperm whale depredation. Using data from 1995-2017, (Peterson and Hanselman (2017) estimated killer whale depredated sets in the fishery resulted in catch rate deductions from depredated sets only of 45%-70% and for sperm whales the reductions were from 24-29%. Only HAL data that had depredation recorded by observers were used in estimating these depredation values. It is important to note that depredated sets only represent a fraction of the total HAL sets in the fishery. Thus, despite relatively high reductions when depredation is present, only a relatively small fraction of HAL sets are depredated (~5-15% of human observed sets). To estimate overall removals, the proportion of catch depredated as recorded by observers on HAL sets is proportionately scaled up to account for all HAL removals (i.e., the rate of depredation and the percent of sets depredated based on observer data is assumed to reflect the rates across the entire HAL fishery). The overall estimated sperm whale-associated removals from 1995-2019 (40t - 310t annually), are minimal in comparison to the overall fishery catches of all gear types in the GOA (~1%). At this time, no depredation information is used from Electronic Monitoring in these analyses, while all fishery depredation information is derived from observer records only. More information can be found in Peterson and Hanselman (2017).

To adjust ABC due to whale depredation, the authors must predict future rates. To adjust catches in future years, the authors attempt to predict future depredation rates based on the average of the last three complete years of catch and multiply this average by the amount ABC is increasing or decreasing. The ABC values found in the SAFE document are deducted for these projected depredation estimates resulting in the final ‘whale adjusted’ $ABC_{(w)}$ and $OFL_{(w)}$ estimates that are used for management advice.

There appears to be a general decline in sperm whale depredation in most areas of the GOA since 2017, predominately in the CGOA. While the stock assessment authors have not yet fully investigated this, it could be partly due to more of the catch being taken with trawls and pots. Killer whale depredation has been relatively steady at time series mean levels for the last 3 to 4 years (but killer whale depredation occurs primarily in the BSAI). Although the SSC has requested that updated whale depredation

coefficients be estimated and incorporated into the models, the low total removals (i.e., compared to total catch) and generally steady rates of removal indicate that re-estimation is unlikely to appreciably influence the assessment. However, reevaluation of whale depredation coefficients is a future research priority.

During the development of Amendment 101, one of the concerns that was raised was the potential for increases in the magnitude of whale depredation on the remaining HAL fishery. The current methodology will account for any increases in the number of sets depredated upon if whale depredation increases in the HAL fishery (assuming observer data adequately reflects changes in the percent of sets depredated, which may be further impacted by the switch to EM), while also addressing reduced overall HAL effort in response to an increase in pot effort (e.g., switching from HAL to pot gear). However, further analyses will be required if changes in the magnitude of depredation during a set (in terms of the concentration of whales and/or associated removals on each set) is increasing for HAL vessels as more of the fleet transitions to pots.

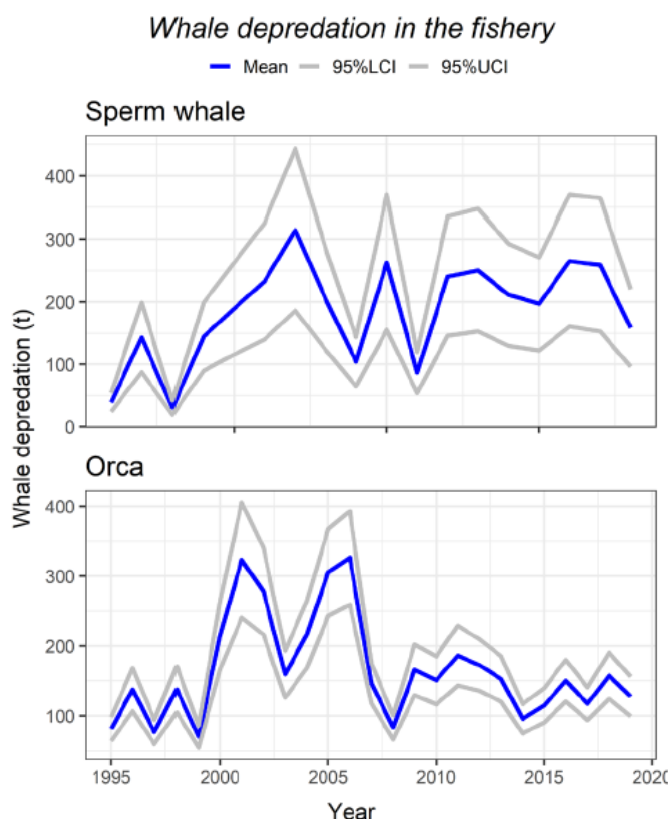


Figure 7-1 Whale depredation in the fishery, includes BS fishery.

7.2 CPUE estimation

For the IFQ fisheries, catch per unit effort (CPUE) is a measure of target harvest in terms of gear deployed. CPUE is denominated in lbs./hook for HAL fishing and lbs./pot for pot fishing, but these metrics are not equivalent and thus not standardized into one index. CPUE is derived from estimates that are reported for observer data and for logbook data. At the time of the Amendment 101 analysis, the best available sablefish data were average catch rates for pot gear in the BSAI during the 2006 through 2012 period, calculated based on either observer data or logbooks. For that period, the average CPUE for the BS area was around 19 lbs./pot (observer data) or 25 lbs./pot (logbook data). The average CPUE for the AI area was around 11 lbs./pot (observer data) or 26 lbs./pot (logbook data). These CPUE levels were not

expected to be indicative of pot productivity in all GOA areas, as the BSAI likely differs in abundance, fishing depth, and environmental conditions (NPFMC 2016).

At this time, pot CPUE is not included in the sablefish fishery CPUE index. Stock assessment authors are continuing to explore development of a catch rate index for HAL and pot gear as additional years provide a longer time series of data. While pot CPUE are not yet included in the stock assessment model, the data are reported in the assessment.

Page 31 of the GOA Groundfish SAFE provides nominal CPUE and standard error estimates for the pot fishery in the GOA by subarea, included in Table 7-1. The analysts emphasize that these values, (simple division of lbs/pots) must be differentiated from the actual CPUE index for HAL gear used in the assessment, which goes through a statistical standardization routine. Mainly, the pot CPUE in this table cannot be directly compared to the HAL CPUE used in the assessment, because the latter uses a more rigorous approach that is not yet developed for the pot data. Additionally, it is difficult to have confidence in the observer data CPUE estimates (lbs/pot) or to discern trends, because pot catch rates have high standard errors (SE). CPUE was higher in the GOA than in the BS. Estimates derived from logbook data tend to be lower than observer data. From 2017-2019, in all areas except the WG, it appears the general trend is an increasing CPUE, though some data are confidential, and trends will become more apparent with additional years of data. In 2019, based on observer data, WY had the highest pot CPUE in 2019 (70lbs/pot), though the logbook data show a CPUE of 39lbs/pot in the same year and subarea. Based on logbook data, SE has the highest CPUE in 2019 (42lbs/pot). The analysts refer readers to the “Pot Fishery Effort and Catch Rates” section of the SAFE for further detail on evaluating these data. At this time, there is only one category for pot gear in the observer database so all pot catches are combined regardless of pot style.

Table 7-1 Information on GOA sablefish pot fisheries from observer and logbook data by FMP sub-area and year.

Source	Area	Year	Vessels	Pots	Sets	lbs./pot	SE
Observer	CG	2017	3	1,156	28	28	12
		2018	7	5,230	167	45	14
		2019	7	3,271	97	58	12
Logbook	CG	2017	9	10,398	273	25	4
		2018	12	18,892	533	34	5
		2019	15	28,944	851	40	5
Observer	WG	2017	3	466	19	74	23
		2018	3	1,800	55	53	15
		2019	C	-	-	-	-
Logbook	WG	2017	3	2,936	74	49	12
		2018	8	12,628	344	33	9
		2019	7	11,653	246	34	6
Observer	WY	2017	C	-	-	-	-
		2018	5	758	35	64	25
		2019	4	859	32	70	22
Logbook	WY	2017	10	18,106	606	26	4
		2018	11	11,655	383	33	7
		2019	14	17,728	585	39	6
Observer	EY/SE	2017	C	-	-	-	-
		2018	3	358	21	48	20
		2019	4	1,236	54	60	7
Logbook	EY/SE	2017	8	5,133	215	36	6
		2018	8	4,739	196	50	12
		2019	7	4,595	186	42	5

Source: Goethel et al. 2020.

Note: When there are fewer than three vessels the data is not shown due to confidentiality

7.3 Size selectivity

The Amendment 101 analysis considered whether the size selectivity of pot longline gear would be vastly different from HAL gear. Presently, the two gear types are combined for assessment purposes because the catch composition is similar and there has been limited data and/or time series of data to allow independent estimation of pot selectivity and fishing mortality in the model. The recent increase in pot effort in the GOA and the introduction of innovative gear and techniques will likely influence size selectivity of pot gear overall. At present, escape rings designed to let small fish exit the pot are not required but are used by a portion of the fleet. According to those involved in the fishery, “sorting” for larger fish in sablefish pots is an ongoing process to find the most successful combination of escape ring size and soak time, which can be adjusted while balancing impacts on product quality and need to tend to gear. As practices and gear in the sablefish pot fishery continue to be refined, size of fish selected by the gear may also continue to change.

The Amendment 101 analysis also noted that adequate fish lengths and age compositions are needed from fish caught in pot gear before the stock assessment authors could fully evaluate size selectivity of pot gear and the potential effects on the sablefish stock and stock assessment. The stock assessment authors have compared the length frequencies recorded by observers in the GOA sablefish pot and HAL fisheries (Figure 7-2 and Figure 7-3). No length or age data are gathered through EM, so an adequate sample size from observer data is necessary in order to have proper representation of the size distribution of the catch. As shown in Table 7-2, the number of samples from pots still represent a small portion of total samples and the number of samples varies by subarea. Additionally, a notable decrease in samples across both fleets occurred in 2020 due to impacts of the COVID-19 pandemic on observer deployment. COVID-19 also brought on reduced fishing effort early in the year for some partial coverage fisheries, leading to a scenario where there was little partial coverage observer data collected in the calendar year 2020. Section 6 describes observer coverage and EM in the GOA sablefish IFQ fishery in more detail.

Based on available data, some evidence exists to suggest a difference in the length frequency of sablefish caught with pot gear as opposed to HAL gear, with HAL gear producing slightly larger sablefish on average, particularly in WY and SE (Figure 7-2 and Figure 7-3). The average length of sablefish caught in the GOA between 2017 and 2020 was smaller for sablefish caught by pot gear (56-59cm or roughly 22-23 inches) than HAL longline gear (61-65cm or roughly 24-26 inches), but the distributions indicate that both fisheries focus primarily on adults. Generally, juvenile sablefish are those 20-45cm. Fifty percent of males are mature at 57 cm (5 years) and fifty percent of females are mature at 69 cm (6.5 years).

As caveated in the Amendment 101 analysis, differences in sablefish length could be attributed, in part, to fishing in different areas. Over the 2017 through 2020 period, pot gear effort was relatively concentrated in a few specific areas in the GOA (as described in Section 3.1) while HAL effort was generally more spread out. Depth does not appear to be a significant predictor of sablefish length, but geographic area likely is, especially during time periods of large recruitments into the fishery. The effect of large recruitment events and the influx of small fish into the population of certain age classes further complicates interpreting estimates of size selectivity, particularly without a greater number of samples.

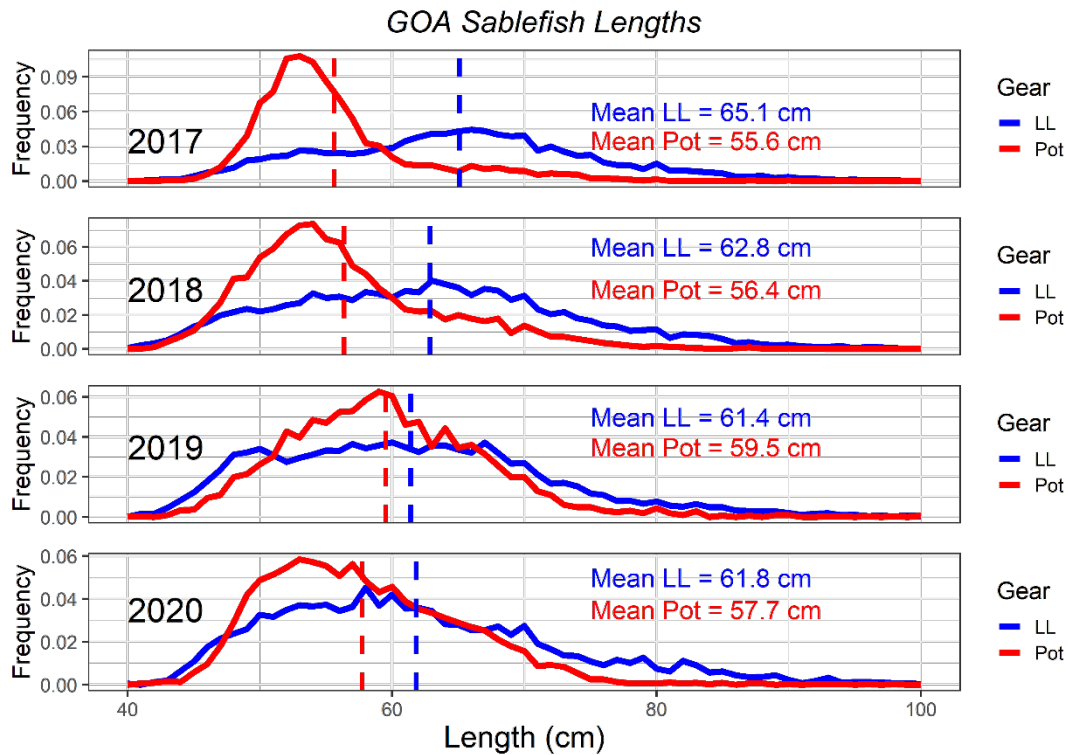


Figure 7-2 Length distribution of GOA sablefish IFQ catch by gear, 2017 through 2020 (Source: observer data provided by AFSC)

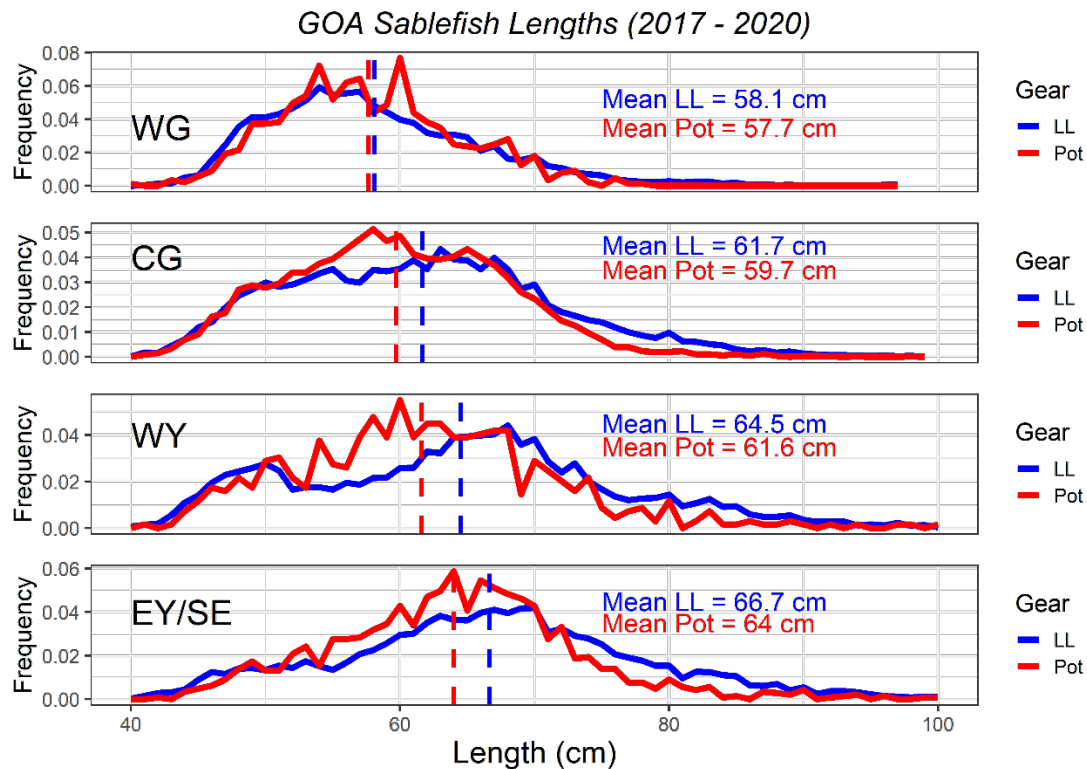


Figure 7-3 Length distribution of GOA sablefish IFQ catch by gear and area, 2017 through 2020 (Source: observer data provided by AFSC)

Table 7-2 Number of observer sampled sablefish lengths

Year and Subarea	# HAL samples	# Pot samples	Total samples
2017	7670	795	8465
WG	733	124	857
CG	3541	249	3790
WY	940	60	1000
SE	2456	362	2818
2018	7965	1831	9796
WG	1138	189	1327
CG	3656	1331	4987
WY	1284	223	1507
SE	1887	88	1975
2019	10372	1618	11990
WG	1930	10	1940
CG	3848	895	4743
WY	2277	257	2534
SE	2317	456	2773
2020	2882	1737	4619
WG	174	285	459
CG	953	1190	2143
WY	706		706
SE	1049	262	1311

8 Vessel and gear characteristics

Over the first few years of the GOA sablefish pot fishery, different types of pots of many shapes and sizes have emerged through industry innovation. Pot designs have been described as rectangular, trapezoidal, conical, collapsible/slinky, and stackable, and Figure 8-1 illustrates a few of the different types of pot gear used in the GOA sablefish pot fishery. Discussions with fishery participants broadly reflect that experimentation with this gear type is still occurring and that gear configurations and vessel conversions will likely continue and vary. The analysts have included descriptions and pictures of some of the types of pots that are being used in the sablefish pot fishery. However, the analysts recognize there may be other designs being used and as described in Section 10, and they encourage the public bringing forward any further information on gear innovation that may be valuable for the Council to be aware of.



Figure 8-1 Stackable, collapsible, and trapezoidal pots

Despite variations in design, there are specific requirements that all pots in the GOA sablefish IFQ fishery must adhere to. Pot longline gear, but not pot-and-line (i.e., single pot) gear is authorized in the GOA IFQ sablefish fishery. Pot longline gear means a stationary, buoyed, and anchored line with two or more pots attached. Regulations at CFR §679.2 specify that pots used in a pot longline or pot-and-line set for sablefish must comply with the following:

- (i) *Biodegradable panel*. Each pot must be equipped with a biodegradable panel at least 18 inches (45.72 cm) in length that is parallel to, and within 6 inches (15.24 cm) of, the bottom of the pot, and that is sewn up with untreated cotton thread of no larger size than No. 30.
- (ii) *Tunnel opening*. Each pot must be equipped with rigid tunnel openings that are no wider than 9 inches (22.86 cm) and no higher than 9 inches (22.86 cm), or soft tunnel openings with dimensions that are no wider than 9 inches (22.86 cm).

Conversion costs

One of the concerns during Amendment 101 discussions that many GOA sablefish QS holders would not be able to take advantage of the opportunity to use pot longline gear, either because their vessels are too

small to fish pot gear safely or practicably, or because they cannot afford the cost of acquiring pot gear and reconfiguring their boat. NPFMC 2016 provided estimated investment costs associated with sablefish fixed gear. The estimates are useful in establishing gross differences in investment expenditure between the gear types, suggesting that pot gear may represent a much greater initial investment. The analysis provided a rough estimate that a pot longline set-up could represent an investment of around \$12,000 to \$16,000 per mile in gear, not including vessel modifications (NPFMC 2016).

Conversion costs seem to vary and depend to a large extent on how each vessel was set up to begin with. Traditional pots could weigh up to 120 pounds each and would require ample deck space and a boat with enough stability – especially if a vessel intends to remove gear from the grounds while delivering its catch. For a HAL operation, transitioning to pot gear could be a relatively expensive conversion — \$300,000 to \$750,000, depending on the need for bigger generators or upgrades to the hydraulic system. From anecdotal reports, the true cost of converting to pot fishing is often masked because upgrades are made as part of a general refit that may involve other costs. Some anecdotal reports place the conversion costs for vessels that are making minimal, targeted upgrades in the range of \$75,000 to \$150,000.⁸ Generally, the pots themselves and hauling capability represent the greatest expense. Smaller-sized vessels may face additional costs or operational obstacles when dealing with the acquisition and onboard storage of the additional, larger-gauge buoy line required to fish pots in a longline format.

The development of “slinky pots,” which appear to have gained popularity among the fleet, may have altered conversion costs by enabling smaller boats to transition to pot gear without having to drastically alter their vessels. Some have indicated that they are able to use all of the same gear (line, hauler, anchors) that they normally would use while longlining and simply “snap on” this style of pot. This is a much smaller initial investment in gear than what has historically been needed to convert a vessel to pot fishing. Slinky pots are collapsible and reduce the amount of space on deck required to store pots (Figure 8-2). These types of pots sell for roughly \$100-\$150.⁹ Furthermore, the lightweight nature of these pots (< 10lbs) could potentially reduce the severity of gear conflict and entanglements described in Section 9. The analysts look to fishery participants to provide further input on the feasibility and catch rates of slinky pots across different fishing platforms, or fishing in different areas/depths.



Figure 8-2 Comparison of space required on deck for 60 large, stackable black cod pots (left) and 650 collapsible pots (right). Source: Fish Tech Inc., social media, June 2020.

⁸ B. Burkholder. Sablefish and Halibut Pot Association. Personal communication, February 2020.

⁹ <http://www.alaskafishradio.com/lightweight-collapsible-codcoil-black-cod-pots-can-barely-keep-up-with-demand/>

Biodegradable panel

NMFS has received several inquiries regarding the regulatory requirement for a biodegradable panel. This regulation has been met by sewing in biodegradable mesh. In the event the pot is lost or abandoned, the biodegradable mesh degrades, leaving an escapement hole which is parallel to and along the bottom of the pot.

With the development of new types of pots, fishery participants and gear manufacturers are working to address gear requirements while finding a design best suited for harvesting sablefish. The regulation has been met in slinky pot fisheries by sewing in one or two full biodegradable panels into the side of the pot, which presumably end up parallel to and within 6 inches of the seafloor. Some fishery participants have inquired as to whether this concept will work with the slinky pot *doors*, whereby the door would be held closed using a biodegradable line and then the door would need to swing open. However, the pots are configured differently from traditional square pots and we do not know whether the door will actually fall open (which would depend on how the pot lands on the seafloor) or whether the opening would end up parallel to and within 6 inches of the bottom of the pot or seafloor. With the goal of providing consistent regulatory guidance to the IFQ fleet, NMFS Office of Law Enforcement has reviewed the regulation and, with other Agency input, determined that the proposed slinky pot door opening does not meet the regulatory requirement. The regulation stipulates a panel that is biodegradable, not a door latch. Slinky pots with biodegradable panels may still be used, however, for a new slinky pot configuration with a latched door to be considered, the Council would need to recommend additional analysis to determine whether a regulatory change can be authorized. As noted in Section 10, the analysts encourage interested stakeholders to further engage with the advisory bodies and Council on this issue.

Gear configurations

Pots may be spaced in a variety of configurations, which determine the general amount of space taken up by each vessel and its gear. The December 2013 discussion paper on this action notes that 180 pots would be equivalent to the length of a HAL longline set (NPFMC 2013). That paper estimates that pots are set roughly 25-50 fathoms apart (300 feet), noting that a set of 180 pots would cover around 10 miles. A separate comment in the same discussion paper estimated that six two-mile pot longline strings would cover grounds similar to a HAL longline vessel. That paper estimated that strings are made up of 30 to 50 pots, which is reinforced by Observer Program data on the average number of pots per string in Table 8-1. This would place the number of pots fished on 12 total miles (six strings) between 180 and 300 pots. One fishery participant indicated that a 1.5-mile string of gear may run 33-50 pots. This equates to 3 strings at 3 miles each plus 1 mile of spacing in between. Others have indicated that the 120 pot limit in SE and WY limits them to approximately 4 miles of gear. The analysts would appreciate further estimates from fishery participants to update these estimates.

Table 8-1 Average pots per string by subarea

Year	CG	WG	WY	SE
2017	43	39	34	30
2018	30	37	21	16
2019	35	53	23	20
2020	41	39	-	34

Source: NMFS AFSC Observer Program sourced through NMFS AKR, data compiled by AKFIN in Comprehensive_OBS.

Gear conflict and grounds preemption

While development of GOA Amendment 101, the Council heard testimony asserting that reintroducing pot longline gear to the GOA could exacerbate grounds preemption and/or gear conflicts with HAL gear. These issues, should they arise, are most likely to pose a significant adverse impact on non-pot gear

fishermen in situations where vessels operate in close proximity, or when there are no viable alternative fishing grounds to which a vessel that encounters pot gear can move.

When HAL gear, which is relatively light weight, becomes entangled with the heavier pot gear, the HAL gear breaks and is often lost. HAL fishermen testified to the Council that the presence of just one or two vessels using pot gear could preempt a substantial area, forcing hook-and-line fishermen to move to avoid gear loss. Pots lost or stored on the fishing grounds over a long period of time can also contribute to this problem. Between 2017 and 2020, 1,436 pots for sablefish landings were reported lost in the GOA.

In response to these concerns, GOA Amendment 101 implemented several regulations to minimize potential interactions between HAL gear and pot longline gear. These provisions included pot limits, requirements for vessel operators to use pot tags issued by NMFS (Section 9.1), requirements that pot longline gear be redeployed within a certain amount of time after being deployed, a requirement in the SE area that pot longline gear be removed from the fishing grounds when making a sablefish landing, and requirements to mark pot longline gear deployed on the fishing grounds. The following sections describe how these requirements have been put into practice, as well as some of the intended or unintended consequences of these requirements. Much of the information contained in the following sections is qualitative information that has been gleaned from discussions with those involved in the fishery, either through participation, management, or enforcement. As such, the analysts refer readers to Section 10 of the document for a list of topics that would benefit further from public testimony.

When designing Amendment 101, the Council selected different pot limits for different GOA subareas. This allowed the Council to account for the make-up of the fleet and the physical nature of the sablefish fishing grounds in each management area. A pot limit caps the total amount of fishing grounds that any single vessel can preempt at a given time. Combined with gear retrieval requirements limiting the amount of time that gear can remain on the grounds, this measure was primarily meant to limit a vessel's "footprint" on the fishing grounds, which is correlated with impacts on other fishermen of preempting productive fishing grounds. However, as acknowledged in the analysis, limiting the number of pots may reduce operational efficiency if the limit is lower than what a skipper deems optimal for his or her vessel.

Skippers rely mainly on radio contact to mitigate gear conflict, but pot vessels may not always be present while soaking their gear. Enforcement officers have not had any reports of gear conflict between pots and HAL or trawl gear, though there have been some reports to the contrary in discussions with the fleet. Fishery participants have noted that vessels fishing with pots generally are not setting pots back in the same spots, as they would have already caught most of the catchable market-fish. Additionally, one fishery participant indicated that, in SE, five days of fishing pots is equivalent in catch to two weeks of fishing HAL because of the magnitude of whale depredation, so less time may actually be spent on the grounds; thus reducing the severity of any issues with grounds preemption.

Alaska Longline Fishermen's Association (ALFA) conducted its own survey to gather information on gear conflicts between commercial fishing vessels using HAL and pot gear in the Alaskan Sablefish IFQ fishery during the 2019 Alaskan Sablefish IFQ fishery. The survey was distributed to approximately 100 ALFA members comprised of vessel owners and crew, and 19 responses were received. Almost all the respondents were vessel operators. While there are multiple caveats to these data (not a random sampled, response bias), some respondents indicated that the edge is crowded with vessels looking for open space to set gear on a high proportion of trips in SE and CG. Survey respondents noted that while gear entanglement and gear loss do occur on a few trips in each area, most boats try and communicate to avoid conflicts. Pot vessels only marking one end of a set, and not tending their gear were the most common complaints noted in the survey.

Efficiency of gear retrieval is best addressed by the industry during Council testimony (as noted in Section 10). From an enforcement standpoint, the gear retrieval requirements (listed in Section 1 under Element 2) in SE have resulted in numerous false statement investigations from pot gear boats requesting

offloads with gear on the grounds for multiple reasons. All of the gear tending "violations" enforcement is aware of are self-reported cases, usually due to mechanical breakdowns, sometimes due to weather. All of the instances have been plausible or apparent enough that further investigation has not been warranted due to the effort it would take to make a prosecutable case.

9 Management and Enforcement

This section describes the pot tag administrative process and management impacts, and the regulatory status of Automatic Identification System (AIS) technology.

9.1 Pot tag requirement

To participate in the sablefish IFQ pot fishery, a vessel owner must apply to NMFS annually to register a vessel to participate and may request new pot tags for a specified vessel, and specific district or regulatory area. All pot longline gear registered to a vessel participating in the sablefish IFQ fishery must have a registered tag attached to the pots before leaving port and the tag may only be removed from the pot after the pot is returned to shore.

The owner of a vessel requests pot tags by completing the IFQ sablefish pot longline gear: vessel registration and request for pot gear tags application form.¹⁰ The form requires the vessel owner to assign the requested pot tags to a vessel licensed by the State of Alaska. The vessel's length overall (LOA), as recorded on the vessel's U.S. Coast Guard (USCG) Certificate of Documentation, must be consistent with the length category specified on the IFQ permits used by persons harvesting IFQ on board the vessel.

NMFS will register the pot tags to the vessel owner, including:

- Number of pot tags requested by IFQ regulatory area or district within a regulatory area (up to the maximum number of pots specified);
- Unique serial number imprinted on each pot tag;
- Pot tag color unique to the IFQ regulatory area.

A valid pot tag is inscribed with a legible serial number and color coded according to the IFQ regulatory area to which the tagged pot is registered and where the pot longline gear will be fished. A pot tag color coded to the regulatory area fished with the pot must be fastened to the pot bridge or cross-member such that the entire tag is visible and not obstructed by the pot structure or another pot tag for a different regulatory area. NMFS does not authorize transfers of pot tags from one individual to another.

The vessel owner is required to have tags for each pot and may request a specific number of pot tags. The maximum number of annual pot tags issued to a vessel owner is equal to the pot limit established for the use of pot longline gear in the GOA Sablefish IFQ fishery:

Limit of 120 pots per vessel in West Yakutat and Southeast outside waters (WY and SE).

Limit of 300 pots per vessel in Western GOA and Central GOA (WG and CG).

Figure 9-1 shows examples of pot gear tags for each of the specific GOA registration areas and identifies the pot limits for each.

¹⁰ IFQ SABLEFISH LONGLINE POT GEAR: VESSEL REGISTRATION AND REQUEST FOR POT GEAR TAGS, and IFQ SABLEFISH REQUEST FOR REPLACEMENT OF LONGLINE POT GEAR TAGS application forms are available at <https://www.fisheries.noaa.gov/permit/alaska-ifq-halibut-sablefish-and-cdq-halibut-program-fishery-applications-and-reporting>



Figure 9-1 Examples of GOA sablefish IFQ pot tags and area-specific pot limits

9.1.1 Replacement tags

If a pot longline tag is lost, stolen, or mutilated, the tag must be replaced by submitting an IFQ sablefish request for replacement of pot longline gear tags application form to NMFS. Tags might be lost due to normal wear, tight gear stacking on small vessels, or the need to cut lines on tangled gear. Fishermen who realize a tag is lost while at sea must notify the enforcement agency to notify them that they will be landing a pot without a tag, thus, avoiding a citation or the seizure of an untagged pot. Sometimes tender vessels are used to deliver replacement tags to vessels that are still on the fishing grounds.

In addition to pot limit enforcement, this form provides an opportunity to enhance the tracking of lost fishing gear. Issuing replacement tags requires some level of trust that the tag was actually lost, but in the long run an individual who was using more tagged pots than the limit allows would be detected during a dockside inspection. ADF&G managers noted that some fishermen do not bother to seek a replacement tag, instead fishing with one less pot. Issuing pot tags on a multi-year basis would increase the disadvantage of fishing less gear, thus, increasing the incentive to seek replacements and also improving the department's information about the location of lost gear.

A complete form must be signed by the vessel owner. The form is a sworn affidavit to the Regional Administrator indicating the reason for the request for a replacement pot tag or pot tags and the number of replacement pot tags requested by IFQ regulatory area.

9.1.2 Annual administration

Since implementation of GOA Amendment 101 and the pot tagging requirements, this has added additional Agency costs for the management and administration of the IFQ Program. NMFS RAM division administers the registration and issuance process for GOA sablefish IFQ pot tags. RAM staff process application forms for annual vessel and pot tag registration as well as requests for replacement pot tags. RAM staff keep track of thousands of uniquely numbered pot tags and handle each new pot tag when issued to a vessel.

Tags are not available as "ready-made" products and are manufactured according to special requirements (size, biodegradable, etc) which takes approximately three months. Due to the substantive increase in requests for new pot tags in 2020, the Agency ran out of pot tags in the Fall of 2020 causing a backlog of

applications which delayed some fishery participants from fishing. Increases in the number of vessels using pots to target sablefish IFQ each year makes it difficult to gauge how much pot tag stock the Agency should have on hand in order to meet the demand of the upcoming fishing year.

When processing replacement tag requests, RAM staff receive the application form and deactivate individual tags in the database and issue individual replacement tags. This process of tracking individual tag numbers has caught some fishermen by surprise as they don't tend to keep track of the individual tag numbers when setting and hauling gear. This can make it a burdensome task to identify an individual tag number when a tag is lost because a fisherman may need to inspect all of their sablefish pot gear to identify which of their registered tags is missing through process of elimination. To reduce the burden of tracking individual tags throughout the season in case a replacement is needed, a fisherman may request more tags than the actual number of pots they will be fishing. For example, a vessel fishing 200 pots may request the full number of tags allowed (300), so if they lose one, they have spares. Another approach may be to request to replace all 300 tags when only a portion of the tags has been lost.

In general, the annual administration of pot tags is a time-consuming process for NMFS and fishermen because of the amount of time needed to track individual tags. For fishermen, some have designed an ongoing tracking system that allows them to know where their tagged pots are at all times and easily identify when a tag is missing on the grounds or at the start of the season. For other fishermen, they may only identify a missing tag at the start or the end of the season when they inventory each individual pot. Tags that are in numerical order are easier to keep track of rather than tracking 120 or 300 unique pot tag numbers.

Additionally, there may be a lost pot tag that is found and returned to the NMFS RAM office. In this instance, without additional programming work to develop a query tool for the permits database, RAM staff must manually track down the pot tag number in the database to identify the owner and, if still active and not replaced, contact the owner to return the tag. NMFS RAM does not collect information on the location of where a pot tag was lost.

9.1.3 Cost recovery

The cost of IFQ sablefish pot tags issued by NMFS is included in the management, data collection and enforcement costs assessed in the IFQ cost recovery program. This includes the costs incurred by NMFS to purchase, issue, and track pot tags.

Section 304(d)(2)(A) of the MSA obligates NMFS to recover the actual costs of management, data collection, and enforcement (direct program cost) of the IFQ fisheries. NMFS implemented a cost recovery fee program for the IFQ fisheries in 2000 (65 FR 14919). IFQ fishermen pay an annual fee based on direct program cost and the ex-vessel value of fish landed under the IFQ Program. The MSA limits the fee to 3% of the annual ex-vessel value of the IFQ fisheries.

NMFS assesses cost recovery fees only for fish that are landed and deducted from the total allowable catch in the IFQ fisheries. NMFS publishes the individual fishing quota (IFQ) standard prices and fee percentage for cost recovery for the IFQ Program for the halibut and sablefish fisheries in the Federal Register. The fee percentage for 2020 is 3%.¹¹

In, 2020, NMFS RAM issued 50,753 pot tags in response to 281 applications received from vessel operators. Table 9-1 summarizes pot tags issues by area in 2020. This represents a substantive increase in the use of pots to target sablefish relative to 2019 when RAM issued only 15,532 pot tags to 33 vessels. Pot tags cost approximately \$0.70 per tag, including purchase and shipping, making this an expensive provision of the IFQ Program. RAM staff time (approximately 30 minutes to package up a box of 300

¹¹ The 2020 Halibut and Sablefish IFQ Cost recovery report is available at: <https://media.fisheries.noaa.gov/2021-01/ifq-cost-recovery-report-2020-akro.pdf?null>.

tags) and shipping costs (approximately \$24 to mail a box) are billable to Halibut and Sablefish cost recovery. Tags that are used for multiple years reduce overall management costs by distributing the costs of tags over the time they are used. RAM must maintain a stock of pot tags in the office for issuance and these costs are incurred at the time of acquisition to ensure that tags are available so that requests for pot tags can be processed in a timely manner. This front loads the costs of this program in years when RAM must order additional tags.

Table 9-1 GOA Sablefish Pot tag limits and number of pot tags issued in 2020 for each regulatory area.

Area	Pot Limit	Pot tags issued
WG	300	13,332
CG	300	20,823
WY	120	8,728
SE	120	7,870
2020 Total		50,753

9.1.4 NMFS recommendations

NMFS recommends the Council consider if pot tags continue to be a necessary provision of this program and NMFS also suggests changes to regulations to combine the IFQ sablefish pot longline gear: vessel registration and request for pot gear tags application form with the IFQ sablefish request for replacement of pot longline gear tags application form. One form contains both the annual vessel registration requirement, confirming vessel participation and the option to request new pot tags. The other application is the request for replacement pot tags application. To participate each year and request replacement tags, a fisherman needs to submit both forms, but often NMFS only receives an application for replacement tags. To ensure that both are submitted, RAM staff would need to contact fishermen and request the second application to be filled out annually. This has increased confusion and frustration with the additional application and can be time consuming to try and contact a fisherman while they are out fishing. Combining the two application forms would improve clarity and consistency and reduce the amount of paperwork necessary each year.

The requirement for pot tags is a provision of the IFQ Program that is administratively burdensome and costly to implement. NMFS OLE and the USCG District 17 have assessed that this gear marking requirement is not useful for the at-sea enforcement of pot limits (A. Duncan and J. Brennell, pers. comm., March 4, 2021).

9.2 Automatic Identification System (AIS)

When the Council initially considered allowing pot longline gear in the GOA sablefish IFQ fishery, Automatic Identification System (AIS) technology was analyzed as a potential gear specification requirement that could alleviate concerns about gear conflict. At the time of initial review, an AIS element of the action alternative would have required both end buoys on a sablefish pot longline set to be marked with a transponder that is detectable by an AIS receiver “or an equivalent system”. The thought behind the element was to make it easier for pot gear, non-pot gear, and non-fishing vessel operators to detect the location of a pot longline string and mitigate entanglements, gear loss, and risks to safety at sea. Ultimately, the Council did not include an AIS (or equivalent) gear specification in its final recommendation for two reasons: the Council did not want to establish inflexible regulations on the application of a rapidly developing technology area, and the use of AIS on fishing gear is not currently authorized by the responsible government agency – which, in the United States, is the Federal Communications Commission (FCC). The Council’s final decision document for the recommendation of GOA FMP Amendment 101 includes an appendix that describes AIS technology and the regulatory

environment surrounding it, as well as cost information for potential gear applications as compiled by Council staff circa 2015.¹²

Short of recommending a particular gear-marking or gear-tracking technology, the Council's final motion encouraged IFQ holders "to work co-operatively to develop electronic reporting protocols for reporting the location of pots being fished and/or pots left on the fishing grounds as well as any other methods or methodology that may enhance the sablefish pot longline fishery." The analysts are not aware of any formalized or emergent electronic reporting practices among the GOA sablefish IFQ fleet at this time. The Council did, however, recommend several gear specifications for pot gear fishermen that are intended to mitigate gear conflict and gear loss. The required specifications include marking both ends of a pot-longline set with 4-buoy clusters as well as a flagpole with a radar reflector. Those measures were judged to be relatively low-cost and make gear more visible to vessels within line-of-sight without using the AIS radio frequency. As a note, regulations do not prohibit fishermen from using type of gear tracking technology that do not operate on the AIS frequency; an example of such equipment would be anything that operates on the Iridium Satellite Communications network.

For this report, the analysts felt it appropriate to revisit the regulatory status of AIS use on fishing gear due to continued interest among fishery participants and anecdotal reports that some amount of AIS gear-marking has occurred in this fishery and other fisheries, including some outside of the Alaska region. This report does not presume to resolve the question of whether AIS is being used for gear-marking or lay out a path for FCC authorization, which would be outside of the purview of the Council and NMFS Alaska Region. Rather, this section serves as a reminder to stakeholders of AIS's regulatory status and an opportunity for stakeholders to communicate any desires for future authorization of AIS to the Council and NMFS if that is their position.

In November of 2018 the FCC issued a notice advising the public that it had "observed a proliferation in the use and marketing of noncompliant devices that operated on radio frequencies assigned to [AIS], which are authorized exclusively for marine navigation safety communications." The FCC issued notice that the use of noncompliant devices should stop immediately, and that "sellers, advertisers, and operators of noncompliant AIS equipment may be subject to substantial monetary penalties."¹³ In December 2018, the Council responded with a letter to the FCC expressing concern about the prohibition and asking the FCC to allow AIS to serve as Private Aids to Navigation (PATON) to mark fishing gear. The Council's letter reads, in part:

"In the North Pacific, fishermen are rapidly adopting AIS to mark fishing gear, not only to allow fishermen to find their own gear, but more importantly, to avoid vessel entanglements with someone else's gear which create safety at sea issues and economic losses. The affordability of AIS and its longevity and durability make AIS an obvious choice by fishermen to mark fishing gear in all visibility conditions [...].

The Council encourages the FCC to reconsider its most recent enforcement advisory notice that prohibits the use of AIS to mark fishing gear. We request that the FCC commence a process that includes the U.S. Coast Guard and Alaska fishermen to approve the use of AIS fish net buoys as PATON to mark fishing gear. Taking this action will reduce navigational hazards, property damage to vessels and gear, improve safety at sea for crew, prevent overfishing of valuable

¹² See the Final EA/RIR for GOA FMP Amendment 101 Appendix 2 (October 1, 2016), available at: <https://www.fisheries.noaa.gov/resource/document/environmental-assessment-final-regulatory-impact-review-amendment-101-fmp>.

¹³ See https://docs.fcc.gov/public/attachments/DA-18-1211A1_Rcd.pdf, accessed February 2021.

fishery resources, and provide better utilization of these fishery resources. Furthering the wise use of our nation’s fish resources while improving safety at sea should be our common objective.”¹⁴

In December 2020, the U.S. Congress passed H.R. 6395 – National Defense Authorization Act (NDAA) for Fiscal Year 2021, which became law on January 1, 2021 (Public Law No: 116-293).¹⁵ Section 11206 of the NDAA is titled “Authorization of the use of Automatic Identification Systems Devices to Mark Fishing Equipment. The law requires the FCC “to initiate a rulemaking proceeding to consider whether to authorize covered devices [i.e., devices used to mark fishing equipment] to operate in radio frequencies assigned to the Automatic Identification system” **no later than the end of June 2021**. The law requires the FCC, in consultation with the Coast Guard and other parts of the Executive Branch, to *consider* authorizing AIS for this use and whether it can be consistent with the core safety purpose of AIS. The law does not guarantee that such authorization will be granted.

The United States Coast Guard (USCG) enforces the use of AIS by vessels that are required to transpond if they are greater than or equal to 65’ LOA and operating in the U.S. territorial sea (within 12 nm from shoreline). While FCC regulations do not currently allow AIS on fishing gear, USCG boarding officers will not typically check for unauthorized AIS transmitters on fishing equipment during at-sea inspections unless requested to do so by the FCC’s Enforcement Bureau. The USCG has published a [Frequently Asked Questions](#) guide about AIS on its website. When reached for input on this review, NOAA OLE stated that no enforcement cases have stemmed from unauthorized use of AIS on fishing gear.

10 Topics of continued interest that could be informed by industry knowledge and public testimony

This report concludes with an open-ended list of topics or questions that the analysts encountered while speaking with fishery participants, managers, and stock assessment scientists, and while working with the data that are available. In many instances, questions arose that are not objectively answerable at this time, either due to the new and expanding nature of the sablefish IFQ pot fishery where industry participants are still developing knowledge or because the questions point to data that are not collected systematically or at all. This list may serve as a prompt for public input at present or future committee, Advisory Panel, or Council meetings. The list might also focus the development of future study questions that – if there is a shared interest between managers, scientists, and participants – could be addressed over time through the structured collection or co-production of knowledge or through the typical data collection channels.

- **Gear conflict** was one of the Council’s primary concerns when considering Amendment 101. Instances of gear entanglement between like-gears or two types of gear are not reported nor tracked. Further, gear conflicts do not fall within the missions of the USCG, NOAA OLE, or NMFS unless they also involve a safety incident or are the result of a fishery violation. No formalized data exist by which to determine whether the reintroduction of GOA pot longline gear has resulted in additional gear conflicts. The Council could consider whether any actions it *could* take would mitigate increased gear conflicts if they exist, and then consider whether it has a role to play by recommending data collections that might inform mitigating steps.
- **Gear innovation** – When developing Amendment 101, the Council stated that it did not intend to create regulations that overly specify gear configuration and might hinder developments that improve catch rates, size-selectivity, and/or fish quality while minimizing bycatch. As the pot longline fishery grows, an improved understanding of the gear designs and configurations being used could inform policy questions related to these topics. For example, information on escape ring sizes, configurations, and soak-times could help stock assessors understand selectivity and effort and could allow the Council/NMFS to calibrate its approach to any future gear

¹⁴ Letter accessible at: http://www.npfmc.org/wp-content/PDFdocuments/CM/2019/010219/122718_AISToFCC.pdf.

¹⁵ <https://www.congress.gov/bill/116th-congress/house-bill/6395>.

specification. Particular pot designs might be found to be more or less effective at different depths, with different soak times, or in areas with certain bathymetry or currents. The Council might also benefit from industry input on the efficacy of different tunnel designs/openings in terms of catch-quality and bycatch distribution; the analysts currently have little or no information on *why* certain bycatch may be occurring or whether trends in bycatch (up/down) can be partially attributed to fishery development.

- **Unintended consequences of gear specifications in Amendment 101** – The Council/NMFS required pot longline strings to be marked at both ends, necessitating a certain amount of buoy, flagpole, and – most importantly – buoy line gear. The analysts have no method to assess whether these regulations have reduced gear conflict, or whether they are being adhered to. Since implementation, public comment and accumulated local knowledge has included accounts that additional gear requirements make the pot longline fishery more difficult for small vessels to participate in – rather than the intended purpose of making the fishery safer for small HAL vessels to fish safely while in the presence of pot-strings.
- The **cost of gear conversion** or the fishing platform upgrades necessary to fish pot longline gear has been reported based on anecdote and public testimony. The variety and rapid evolution of pot gear products means that cost-models based on anything other than contemporary public accounts would become quickly outdated. Likewise, the variety of fishing platforms that target GOA sablefish IFQ means that the cost of conversion to pot gear – which encompasses a wide range of vessel hardware and is sometimes part of a broader upgrade/refit – is difficult to isolate and compare across vessel categories. Nevertheless, these costs could continue to be of interest to the Council if pot-fishing – in the context of whale depredation – becomes a dominant strategy for the fleet as a whole. The Council might be interested in whether, or for whom, pot gear is cost-prohibitive if it were to consider regulatory changes that allow gear-sharing or modify pot limits, for example. In general, the Council might be interested in the relative accessibility of pot gear across the diverse set of IFQ participants. The development of lower-cost pot gear options should be tracked in some manner so that fishery managers can better understand the full set of stakeholders that *could* benefit from its use.
- Fishery scientists can assess catch per unit of effort (**CPUE**) at the per-pot or per-hook level using observer or survey data. Managers – and scientists – might also be interested in CPUE by different metrics, such as per-string or per-trip. Those data are not readily available because of the variation in how gear is deployed (spacing, baiting, skate-length) and variation in trip strategies (mixed-gear, partial deliveries, etc.). A better understanding of how much gear is being deployed and how trips are being orchestrated could provide a better understanding of the relative footprint that each gear type has on the fishing grounds. That information connects to one of the Council’s original interests when considering Amendment 101 – grounds preemption. Relative CPUE by gear type could also influence how long it takes a vessel operator or IFQ holder to complete their fishing in an area. This type of information would help to objectively assess whether any unique grounds preemption related to pot longline gear is mitigated by the fact that an operator could catch quotas more quickly and exit the area, opening up space for others. CPUE metrics may also be used as proxies to estimate costs in terms of bait, fuel, and total fishing time (i.e., labor productivity).

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