

Discussion Paper Halibut Retention in BSAI Sablefish Pots October 2017¹

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1 Introduction

In June 2017, the Council directed staff to produce a discussion paper outlining the steps necessary to allow retention of Pacific halibut in pot gear in the Bering Sea and Aleutian Islands (BSAI) sablefish IFQ fishery.² The International Pacific Halibut Commission (IPHC) recently amended its gear regulations to make pot gear a legal gear type for retaining incidentally caught halibut throughout the waters off Alaska (IPHC Area 2C and all parts of Areas 3 and 4), but only as authorized in U.S. Federal regulations. The Council also asked staff to outline how the Council and IPHC would need to coordinate if the action proposed for consideration was to allow fishermen to target halibut with pot gear in the BSAI. In terms of fishery information, the Council requested data on the number of vessels deploying sablefish pots in the BSAI, estimates of halibut bycatch in pot gear, and the size of halibut taken as incidental catch in sablefish pots.

The use of pot gear to target sablefish in the BSAI has been permitted for nearly the entire length of the Halibut and Sablefish IFQ Program, after a prohibition in the Bering Sea management area was lifted in 1996. Unlike the hook-and-line (HAL) fishery for sablefish, IPHC regulations do not allow BSAI fishermen using pot gear to retain halibut regardless of whether a person on the vessel holds the appropriate halibut IFQ. In the Gulf of Alaska (GOA), fishing for sablefish with pot gear had been prohibited since 1985 due to concerns about grounds preemption, gear conflict, and excess capacity (GOA FMP Amendment 14). That prohibition was lifted when GOA FMP Amendment 101 was

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² Though not mentioned in the Council's motion, staff presumes that any considered action would also include sablefish CDQ. For simplicity, this paper incorporates sablefish CDQ by reference when using the term "sablefish IFQ."

implemented in 2016. The first year of fishing for sablefish with longline pot gear in the GOA commenced in 2017. The regulations implementing GOA Am. 101 allow sablefish pot vessels in the GOA to retain legal-sized halibut, provided they hold the necessary IFQ. As noted above, the IPHC amended its gear regulations after the Council took action on halibut retention in the GOA but before the commencement of sablefish pot fishing in March 2017.

Whale depredation on sablefish longline vessels was the primary driver behind the Council's action to allow pot fishing in the GOA. That action included a halibut retention measure in order to make the fishery more efficient for fishermen with halibut IFQ, but also to better manage the resource. The rationale for action in the GOA noted that allowing halibut retention reduces regulatory discards and the associated mortality. Moreover, discarding halibut in the presence of depredating whales exacerbates discard mortality in a manner that is not well accounted for by assessing the viability of incidentally caught halibut before they are returned to the sea. This same issue and the accompanying logic are motivating the Council to consider changes to its regulations regarding the retention of halibut that are caught in BSAI pot gear.

This paper primarily focuses on the existing Federal and IPHC regulations that govern the retention for sale of halibut caught incidentally or intentionally with pot gear, and how they would need to be amended to allow retention or targeting of halibut (Section 3). The paper also provides background information on the management of the BSAI fixed-gear fisheries, participation in those fisheries (with an eye towards vessels that might participate in a halibut pot fishery), and incidence of halibut bycatch in fixed-gear fisheries (Section 4), and a brief overview of the whale depredation challenge in Alaska waters (Section 5).

2 Background

2.1 Management authority

Any action to allow halibut retention during the BSAI sablefish IFQ fishery involves the Council, NMFS, and the IPHC. The Pacific halibut fishery off Alaska is managed by the NMFS under the authority of the Northern Pacific Halibut Act of 1982, and in coordination with annual fishery management measures adopted by the IPHC under the Convention between the United States and Canada for the Preservation of the Halibut Fishery of the Northern Pacific Ocean and Bering Sea. The IPHC develops regulations governing the Pacific halibut fishery under the Convention, which are promulgated domestically by NMFS. Additional regulations that are not in conflict with approved IPHC regulations may be recommended by the Council. Council action must be approved and implemented by the Secretary of Commerce (Secretary).

The groundfish fisheries in the U.S. exclusive economic zone of the BSAI, including the sablefish fishery, are managed by NMFS under the authority of the Magnuson-Stevens Fishery Conservation and Management Act (MSA). Under the authority of the MSA, the Council developed the Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area and is authorized to prepare and submit to the Secretary for approval any necessary amendments to the BSAI FMP. Regulations implementing the BSAI FMP and general regulations governing groundfish are

implemented by NMFS after Council review and Secretarial approval. Therefore, coordination between the IPHC, the Council, and NMFS is crucial when considering complementary regulatory amendments.

The Alaska Department of Fish and Game (ADFG) has one primary regulation pertaining to commercial take of halibut: halibut may not be taken or possessed for commercial use in a way that is inconsistent with IPHC regulations. As long as the Council and NMFS coordinate to ensure that Federal-waters regulations are in line with IPHC regulation, then state-waters rules would also be aligned. ADFG accomplishes this by adopting Federal rules through a global emergency order. Vessels that are fishing in the BSAI state-waters sablefish fishery with longline gear and hold halibut IFQ may retain halibut; those that do not hold IFQ or are fishing with pot gear must currently discard it. For vessels fishing IFQ, neither a NMFS regulatory amendment to allow incidental halibut retention in BSAI sablefish pots, nor a coordinated NMFS/IPHC package to allow the targeting of BSAI halibut with pots would require complementary action on the part of ADFG. Verification that a vessel possesses the necessary halibut IFQ for the fish it retains would occur through the normal channels.³

2.2 Area definitions

Figure 1 shows an overlay of the NMFS groundfish management areas that are referred to in Federal regulations and the Council's FMPs, and the IPHC areas for waters off Alaska. Halibut retention in sablefish pots is currently permitted in the GOA, but not the BSAI. Note that IPHC Area 4A encompasses parts of both the BSAI and GOA. The following section (Section 2.3) describes a considered action to allow halibut retention in the parts of 4A that overlap the BSAI. That action was not completed.

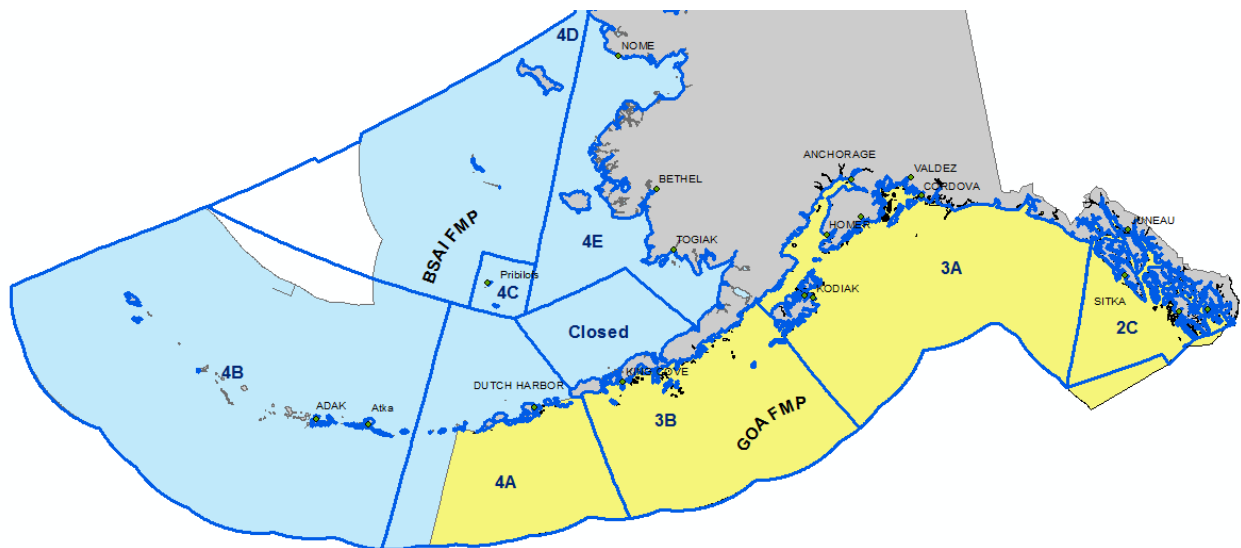


Figure 1 Overlay of Federal groundfish management areas (BSAI and GOA) and IPHC areas

³ Since IFQ are specific to a regulatory area and vessel size category, the amount of halibut retained and landed is crosschecked against the IFQ permit database to verify that the permit holder's IFQ balance is sufficient for the relevant area and vessel size category. In addition, OLE can reference information in NMFS and IPHC logbooks at the time of landing.

2.3 History of this action

The issue of halibut retention in BSAI sablefish pots was first presented to the Council in 2009, when a request to allow retention in Area 4A was forwarded from the IPHC. At that time, the use of pots for sablefish fishing was only allowed in the BSAI, and retention of halibut caught in pot gear was not allowed in any of the Alaska region's state or federal waters. The Council and its IFQ Implementation Committee reviewed a staff discussion paper in December 2012, at which point the Council identified four additional topics to be explored before it would consider a recommendation that the IPHC amend its regulations to allow retention.⁴ Those topics were addressed in an April 2013 discussion paper; they included the spatial and temporal overlap of halibut longline and sablefish pot fishing effort, the need for gear retrieval and gear specification regulations, information on the physical condition of halibut incidentally caught in sablefish pots, and a review of lessons learned from allowing halibut retention in sablefish pots on the west coast (Areas 2A and 2B).⁵

At that point, the Council and IPHC exchanged letters in September 2013 and February 2014 where the Council recommended halibut retention and the IPHC supported further analysis that included measures to limit retention to only incidental amounts; this correspondence is detailed in Section 2.1 of an April 2015 Council discussion paper with the letters themselves in that appendix.⁶ The IPHC determination at the time that retention in Area 4A should be contingent on management measures to cap incidental catch (e.g., maximum retainable amounts (MRA)) was presented to the Council as a policy choice guided by a desire to preserve the characteristics of the existing IFQ halibut fleet. The IPHC did not oppose retention from a biological perspective, but had some concerns about gear conflict and potential disadvantage to vessels that were too small or otherwise unable to switch from longline to pot gear.

The Council produced the April 2015 discussion paper on Area 4A retention (cited above) to scope alternatives, including ones that would limit the amount of halibut that could be retained. Upon review, the Council tabled further consideration for the following reasons: (1) the Council did not feel that it had sufficient data on which to base an MRA; (2) only a small number of vessels were active in the Area 4A sablefish pot fishery, and those were not requesting urgent action on retention at the time; (3) the Council was simultaneously working towards an action to allow longline sablefish pots in the GOA with an option to allow retention of incidentally caught halibut (Am. 101), and the Council did not want to push for the IPHC to allow retention in 4A without first knowing how coordination on the GOA action would resolve. The last point reflects the Council's wish not to create a "patchwork" of retention regulations across areas, with retention allowed in Area 4A but not in the GOA.

Ironically, that patchwork did emerge but in the opposite direction. The Council finalized GOA Am. 101 with a provision to allow incidentally caught halibut, but took no action in Area 4A (or the rest of Area 4 that overlaps the BSAI groundfish management area). 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.⁷ The Council did not define "incidental," but in its letter assured the IPHC that it would monitor

⁴ https://www.npfmc.org/wp-content/PDFdocuments/halibut/4AhalibutPots_dp_1212.pdf

⁵ https://www.npfmc.org/wp-content/PDFdocuments/halibut/4AhalibutPots_ExpanDP-413.pdf

⁶ <http://npfmc.legistar.com/gateway.aspx?M=F&ID=c0c34915-8fce-4871-aa70-81a238258938.pdf>

⁷ <http://npfmc.legistar.com/gateway.aspx?M=F&ID=8bc9eb92-da18-4e5d-883d-10b8f8014428.pdf>

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 Council also provided a December 2015 discussion paper that summarizes the entire process dating back to 2009 and catalogues all associated correspondence.⁸

The IPHC responded favorably to the Council's request and, at its January 2016 Annual Meeting, took action to make pot gear legal for halibut retention in all areas off Alaska. This action reflected the IPHC's acceptance of the Council's good-faith commitment to monitor the incidental nature of halibut bycatch and take action in the future if necessary. Just as importantly, it was also an acknowledgement of the worsening challenge of whale depredation and its effect on both the resource and the halibut and sablefish longline fleets. However, because the Council and NMFS had tabled the retention action in the BSAI/Area 4A overlap, the IPHC's sweeping regulation change created a new round of mismatched retention regulations – and part of the impetus for this discussion paper.

3 Status of regulations and places for future amendment

This section is responsive to the Council's main request for this discussion paper. The following outlines existing regulations regarding halibut retention in pot gear, and identifies places in IPHC and Federal regulations that would need revision to either (1) allow retention "when fishing for sablefish IFQ with pots," or (2) allow retention of halibut IFQ when fishing with pot gear under any circumstances.

3.1 IPHC regulations

The IPHC would not need to amend its regulations if the Council recommends that halibut retention be allowed for vessels fishing for sablefish IFQ with pot gear in the BSAI. They would, however, need to be amended if the Council recommends that halibut retention be allowed in single pots (distinction between single and longline pots is discussed below) or if it recommends that vessels be allowed to catch and retain halibut in pot gear with no other qualifiers.

The IPHC's regulations are published each year, as updated, on its website; the 2017 regulations are available on the Commission's website.⁹ Section 19 regulates legal fishing gear for the commercial catch of halibut. From 2007 through 2015, retention of halibut in pot gear was only legal for sablefish fishermen in Area 2B (British Columbia). In 2016, the IPHC amended 19(1)(b) and 19(2)(b) to allow "retention..." (1) and "possession..." (2) of "...halibut taken with longline pot gear in the sablefish IFQ fishery if such [retention/possession] is authorized by NMFS regulations published at 50 CFR Part 679." As it relates to the issue before the Council, these regulatory clauses have the same three key pieces. The first two might require a request for revisions depending on the Council's objective for future action. The third creates the link between IPHC regulations and NMFS regulations, and is the source of the regulatory "mismatch" that currently requires BSAI sablefish fishermen to discard legal-sized halibut regardless of whether they possess halibut IFQ.

⁸ <http://npfmc.legistar.com/gateway.aspx?M=F&ID=7d531a12-e2df-4f1c-b22f-29df93f5422a.pdf>

⁹ http://iphc.int/publications/regs/2017iphcregs_v20170405.pdf

- The first is the word “*longline*.” The Council should articulate whether it intends for halibut to be retained in pot gear that is not set in a longline format, which is permitted under NMFS regulations for the BSAI area but not in the GOA. The inclusion of “longline” would mean that halibut taken incidentally in “single pots” must be discarded. Future analysis would attempt to determine the prevalence of single or longline pot formats. Anecdotal reports in the previous discussion papers on Area 4A noted that most vessels deploy pots on longlines to make gear retrieval easier and to reduce the incidence of lost gear.
- The second is “*in the sablefish IFQ fishery*.” The Council should articulate whether it intends to allow halibut retention in pot gear that is being used to target another groundfish species, such as Pacific cod. Within NMFS regulations defining Authorized Fishing Gear, Fixed Gear is defined according to the species being harvested (see below). This language would also need to be amended if the Council intended for fishermen to be able to target halibut IFQ with pot gear (in any area).
- The third is “*if [...] authorized by NMFS regulations published at CFR Part 679*.” This phrase means that NMFS regulations govern the application of the IPHC’s legal gear definition by specific area (e.g., BSAI or GOA). NMFS regulations must also align in terms of the species being targeted, so if the IPHC were to amend its regulations to allow targeting halibut with pot gear NMFS would still need to amend its regulations.

The IPHC considers recommended changes to regulations within an annual meeting cycle. Proposals for change coming from the Council or NMFS are first considered at the Interim Meeting, which typically takes place in late November or early December. Final decisions are made at the IPHC’s Annual Meeting, which takes place in the following January. This year, the deadline for proposal submission for the Interim Meeting is October 29, 2017. Given that the process for the Council and NMFS to propose, analyze, and implement amendments to their own respective FMPs and/or regulations takes at least a year, there should be no effective difference in submitting a proposal to the IPHC in October 2017 versus October 2018.

3.2 U.S. Federal regulations (NMFS)

Federal regulations define Authorized fishing gear at Section 679.2. Within that definition, legal Fixed gear includes (*paraphrased*):

- (4)(i) *longline pot gear for sablefish harvested from any GOA reporting area;*
- (4)(ii) *all pot gear for sablefish harvested from any BSAI reporting area*
- (4)(iii) *hook-and-line gear **only** for halibut harvested from any IFQ regulatory area [emphasis added]*
- (4)(iv) *longline pot gear for halibut harvested from any GOA reporting area “if the vessel is fishing for IFQ sablefish in accordance with Section 679.42(l)”*

Subpart (4)(iii) would need to be revised to include “all pot gear” if the Council wants to allow vessels to target halibut with pots. The Council should also specify whether targeting halibut with pot gear would be permitted in all areas or only in the BSAI reporting areas.

Subpart (4)(iv) would need to be revised by striking the language referring to the GOA if the Council wants allow halibut retention in BSAI sablefish pots. If the intent is for halibut to be retained in any type of BSAI sablefish pot gear (longline pots or single pots), it might be simpler to add a subpart (4)(v) that is specific to the BSAI, because *only* longline pots are permitted in the GOA.

Subpart (4)(iv) would also need to be revised if the Council wants to allow halibut retention in pots that are being used to fish for Pacific cod. If the Council does not intend for pot gear used in the BSAI to be subject to the GOA gear requirements in referenced in 679.42(l), it would again be simpler to add a subpart (4)(v) that is specific to the BSAI. That clause could be specific to vessels fishing for IFQ sablefish with pot gear (“all pot gear,” or “longline pot gear”), or left open to any vessel using pot gear (i.e., inclusive of vessels targeting Pacific cod).

Also in Section 679.2, Pot gear is defined in subpart 15 and applies to all pot gear (both longline and single pot formats). Subpart (15)(ii) defines Tunnel openings: “*Each pot used to fish for groundfish 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).*” If the Council elects to pursue an action that allows vessels to target halibut with pot gear, it might consider whether these maximum opening limits should be revised.

Section 679.42, referenced above in 679.2, sets limitations on the use of QS and IFQ. Section 679.42(l) establishes GOA sablefish longline pot gear requirements and restrictions on longline pot gear deployment and retrieval. This includes rules for pot tags, vessel pot limits, restrictions on leaving pots unattended on fishing grounds, and logbook use.¹⁰ Section 679.42(l)(6) states that legal-sized halibut *must be retained* by vessels fishing for sablefish IFQ if a permit holder onboard the vessel has unused halibut IFQ for the appropriate regulatory area and vessel size category. A similar section that addresses the BSAI would need to be added if the Council were to recommend halibut retention in that area. As noted above, the Council should also indicate whether it would like to pursue additional gear specifications or marking requirements for pots deployed in the BSAI that catch and retain halibut.

3.3 Other issues of definition

In past actions related to retention of halibut in the IFQ fishery, both the Council and IPHC have made reference to the retention of “incidentally” caught halibut. Because halibut is an IFQ species and retention is only allowed by those who hold the appropriate IFQ, the concept of incidental catch does not accurately apply.¹¹ Regulations appropriately do not refer to the retention of incidentally caught halibut, but the terminology persists in discussion of the retention topic.

¹⁰ Logbook requirements are further specified at 679.5(c). Any vessel that fishes for sablefish with longline pot gear in the GOA must complete a Daily Fishing Logbook (DFL) or Daily Cumulative Production Logbook (DCPL). Also, IPHC regulations require any vessel greater than 26 ft. in length that is retaining commercially harvested halibut to maintain an IPHC approved logbook.

¹¹ When IFQ is not onboard, halibut is a prohibited species and must be discarded. This paper only addresses circumstances when halibut IFQ is onboard a fixed-gear vessel.

Similarly, the public discourse has often included the term “directed” halibut fishing. NMFS does not use the term “directed” in IFQ fisheries because it is not necessary. Vessels fishing in IFQ fisheries are not directed fishing as defined for the Federal groundfish fisheries and do not have a target; they simply fish and retain fish for which they are using legal gear and possess the necessary IFQ to cover their catch. Directed fishing connotes a situation where a vessel is fishing in a limited access fishery and a “trip target” is assigned after the fact based on the preponderance of the delivered catch. Sometimes the use of the word “target” is unavoidable as a term of art – including its use in this paper – but in an IFQ context it should not be read to reflect anything other than the species that a fisherman is trying to catch on a specific trip or haul.

Defining these terms is not merely semantic exercise. When an objective to retain only incidentally caught halibut is raised, discussion naturally flows toward MRAs. In fisheries that NMFS manages as directed fisheries with trip targets assigned, MRAs cap the proportion of the fish onboard a vessel that the non-target species can account for. However, because there is no trip target and no definition of incidental catch for IFQ species, the concept of MRAs is not a good fit in terms of its use in Federal regulations. Moreover, the concept of MRAs is contrary to the original intent of the IFQ program in that they could require discards of legal-sized halibut or sablefish. When implementing GOA Amendment 101, both the Council and IPHC acted appropriately by committing to reviewing the use of pot gear in the GOA sablefish IFQ fishery after three years rather than setting an MRA-like retention cap to maintain the so-called incidental nature of halibut bycatch.

4 Fishery information for BSAI fixed-gear fleet

The Council requested data on the number of vessels deploying sablefish pots in the BSAI, estimates of halibut bycatch pot gear, and the size of halibut taken as incidental catch in sablefish pots. This section responds to those requests and includes other information as relevant for comparison or to foreshadow future areas of investigation if the Council initiates a full analysis.

4.1 Vessel participation and harvest

Table 1 and Table 2 capture all vessels that participated in BSAI fixed-gear fisheries during the 2011 through 2016 period. Most vessels participated in more than one fishery, and show up in multiple column counts below. The tables are screened for past participation in BSAI fixed-gear as a rough indicator of vessels that might be more likely to take advantage of an opportunity to participate in the BSAI sablefish pot fishery and retain halibut. The purpose of this exercise is to provide the reader with a relative scale of participation in each fishery. Table 1 shows that the BSAI sablefish pot fishery has recently consisted of four or fewer catcher vessels. By comparison, the BSAI pot fishery for Pacific cod has consisted of 46 to 54 vessels in recent years. The set of three to four vessels that recently fished for BSAI sablefish IFQ with pot gear were all less than 60 ft. LOA and generally included one vessel that also fished BSAI cod with pot gear and another that fished GOA sablefish and/or halibut IFQ, depending on the year. No vessels that recently fished BSAI sablefish IFQ with longline gear were also fishing sablefish with pot gear in that area.

Vessels that fish pot gear in the GOA might be of particular interest as potential entrants into the BSAI sablefish pot fishery. Any vessel making that move would need to acquire quota; however, BSAI sablefish quota is among the lowest priced QS shares on the market. Since Table 2 shows only the portion of the GOA fixed-gear fleet that also participated in the BSAI during the 2011 to 2016 period, it does not capture all of the catcher vessels that fished for Pacific cod with pots in that area. The total number of GOA pot cod catcher vessels ranged from 100 to 145.

Table 1 Count of vessels that fished BSAI fixed-gear, by BSAI fishery (2011 through 2016)

	Year	BSAI Sabl. Pot	BSAI Sabl. LL	BSAI Sabl. LL (CDQ)	BSAI PCod Pot	BSAI PCod LL	BSAI Halibut LL	BSAI Halibut LL (CDQ)
CP	2011	3	10	3	5	30	8	14
	2012	1	12	1	5	29	10	24
	2013		7	3	5	30	12	26
	2014		8	2	9	29	13	24
	2015		7		6	29	10	26
	2016		8	3	5	29	3	13
CV	2011	8	52	7	47	10	115	34
	2012	4	42	5	49	10	97	38
	2013	4	38	4	54	14	87	34
	2014	4	36	6	46	7	81	32
	2015	3	38	3	43	6	79	25
	2016	4	36	9	51	1	83	28

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

Table 2 Count of vessels that fished BSAI fixed-gear, by GOA fishery (2011 through 2016)

	Year	GOA PCod LL	GOA PCod Pot	GOA Sabl. LL	GOA Halibut LL
CP	2011	12	1	12	16
	2012	8	1	8	12
	2013	4	1	7	9
	2014	9		8	10
	2015	8		8	9
	2016	8		6	9
CV	2011	21	29	63	108
	2012	21	33	68	98
	2013	21	35	65	96
	2014	17	22	58	93
	2015	18	28	61	91
	2016	15	26	65	90

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

If initiated, a full analysis of a change to the BSAI sablefish fixed-gear fishery will include a matrix of unique vessel counts for each fishery and cross-participation in other fisheries. The BS and AI sablefish TACs are the least fully harvested in the IFQ Program. This underharvest is the result of many factors, including location, markets, target fish aggregation, and whale depredation. For that reason, a full analysis would consider the types of vessels associated with BSAI sablefish QS holders that aren't participating in that fishery or are only fishing part of their holdings. For reference, in 2016 the BS and AI sablefish fishery (both pot and longline) accounted for only 131 of 1,733 sablefish IFQ vessel landings across all management areas. 2016 BS and AI sablefish IFQ landings totaled only 1.06 million pounds out of a combined 3.07 million pound catch limit (35% landed). 2015 was similar, with the areas accounting for

153 out of 1,737 vessel landings and harvesting only 34% of their combined sablefish catch limit. The most recent year when either area took more than half of its sablefish catch limit was 2013, when both areas landed 57% of their TAC. Neither area has caught over 67% of its TAC dating back to 2000, which is the earliest year available on NMFS's catch and landing report website.¹²

4.2 Catch per unit effort (CPUE)

CPUE is an important metric for stock assessment and also for understanding the effects of an action that might shift fishing effort from hook-and-line (HAL) gear to pot gear. In past analyses, the Council has relied on the Groundfish SAFE Report for estimates of CPUE. For the HAL fishery, the Sablefish SAFE report provides two versions of sablefish CPUE (lbs/hook) for each groundfish management area: one based on observer data and one based on fishery logbook data. These figures are provided annually and date back to 1990 (see Table 3.9 on page 392 of Hanselman et al. 2016). In 2015 the logbook CPUE estimates were 0.20 lbs/hook for the BS (n = 309 sets) and 0.30 lbs/hook for the AI (370 sets); the observer estimates were 0.10 lbs/hook for the BS (4 sets) and 0.22 lbs/hook for the AI (349 sets). The SAFE report does not, however, provide the same source of CPUE analysis for the pot fishery, primarily due to sparse observer data and sometimes confidential numbers of observed vessels. In logbook data since 2009, the number of pots, sets, and vessels has decreased, and in 2015 there were no sablefish pot data. Instead the SAFE report estimates pot CPUE based on catch rates in the commercial fishery over a set of years. Because the figure is not provided annually, it is difficult to discern trends in pot CPUE.

For pots, the 2016 SAFE report provides CPUE estimates based on logbook data for the 2006 to 2014 period: 29 lbs/pot in the AI (1,271 sets) and 18 lbs/pot in the BS (3,237 sets). The estimates based on observer data over the 2006 to 2015 period are: 11 lbs/pot (1,156 sets) in the AI and 18 lbs/pot (2,996 sets) in the BS. The effort recorded by observers has also been decreasing since 2009 in the BS and since 2011 in the AI.

Given the variation in CPUE estimates and the decreasing number of observations and logbooks in the pot fishery, AKFIN has experimented with other ways to approach CPUE using observer data. For instance, CPUE could be described as pounds/pot for the pot fishery and pounds per skate in the HAL fishery. Over the 2013 through 2016 time period, observer data yields 35.5 lbs/pot in the AI and 18.9 lbs/pot in the BS. For HAL, the data yields 43.4 lbs/skate in the AI and 67.9 lbs/skate in the BS. The Council and its IFQ Committee could weigh in on whether comparing a pot to a skate of longline gear is meaningful. The most obvious challenge is that skates in the HAL fishery vary widely in the number of hooks. AKFIN could also reduce the granularity of CPUE by reporting at the haul level. One could compare [lbs/pot]*[#pots] against [lbs/hook]*[hooks/skate]*[#skates in a haul]. While this method might not be appropriate for the stock assessment models in the SAFE report, it might make more sense from a management perspective when considering that hauls are the unit of effort on which a whale is or is not depredating.

¹² <https://alaskafisheries.noaa.gov/fisheries-catch-landings>

4.3 Halibut bycatch

The Council requested a summary of estimated halibut bycatch in pot gear. The scope of the data provided here is limited to catch in the BS and AI areas and to trips recorded in NMFS's Catch Accounting System as targeting either sablefish or Pacific cod with either pot or hook-and-line longline gear (HAL). The time series analyzed is limited to 2013 through 2016 so as only to capture years since the restructuring of the partial observer coverage category, to the extent that might have affected bycatch estimation.

Table 3 shows the total amount of halibut bycatch in each of eight fishery/area/gear combinations. The table includes a metric ton (mt) ratio of round weight halibut bycatch to round weight of groundfish catch (mt/mt). Halibut bycatch is listed in (mt) of round weight recorded as opposed to estimated bycatch mortality. Estimated mortality is used for things like debiting bycatch against a prohibited species catch limit, and is calculated by multiplying the round weight of bycatch by a discard mortality rate (DMR) that represents kilograms of halibut killed divided by tons of groundfish harvested. This paper lists round weight of bycatch for two reasons. First, bycatch weight is a better analogue for the amount of halibut that could have been retained under the considered action. Second, the calculation of halibut DMRs underwent a change in 2017, and so estimated mortality would be somewhat inflated during the years included in the table. Specifically, halibut DMRs are now calculated across an entire gear type (e.g. pot gear) rather than being calculated and applied separately for each area and management program. The problem was most acute in area/program combinations where observer coverage was low and a small number of sampled discards could result in an outlier rate. CDQ pot fisheries in the BS and AI had DMRs in the 0.30 to 0.40 range, whereas other pot fisheries were between 0.10 and 0.20. Unless one believes that vessels fishing CDQ fished differently than other pot vessels or treated halibut differently on deck, it is reasonable to conclude that the high DMR was an artifact of low sampling.

Table 3 shows that halibut bycatch ratios do not differ substantially by area (BS vs. AI). The ratio is higher for sablefish relative to Pacific cod, and for HAL gear relative to pot gear. The figures in the table are an aggregation across the 2013 to 2016 period, but annual bycatch ratios within each combination did show several outlier years (though the year itself was not consistent). A full analysis would test for explanations of what might drive a particularly high year of halibut encounter in one of these fisheries.

Table 3 Halibut bycatch (round mt) and ratio of halibut to groundfish (round mt) in BSAI fixed-gear fisheries, 2013 through 2016

Target	Area	POT			HAL		
		Halibut Bycatch	Groundfish Basis Wt.	Ratio	Halibut Bycatch	Groundfish Basis Wt.	Ratio
Sablefish	BS	19	689	0.028	18	207	0.086
	AI	7	261	0.028	109	1,604	0.068
Sablefish Total		27	950	0.028	127	1,811	0.070
PCod	BS	138	158,257	0.001	16,129	639,609	0.025
	AI	3	7,134	0.000	236	8,394	0.028
Pcod Total		141	165,390	0.001	16,365	648,003	0.025
Grand Total		168	166,340	0.001	16,492	649,815	0.025

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

The Council also requested information on the size of halibut that are taken as bycatch in pot gear. AKFIN provided observer data on sampled halibut taken in both pot and HAL gear for all Alaska Federal groundfish management areas from 2008 through August 16, 2017. Table 4 shows the number of halibut taken as bycatch in the BSAI sablefish and Pacific cod fixed-gear fisheries that were sampled by fishery observers during the 2008 through 2016 period.¹³ The BS and AI areas are combined in the table because only 3,300 of the roughly 120,000 samples were taken from the AI. The minimum legal size for commercially caught halibut is 32 inches, or 81.3 centimeters (cm), per IPHC regulations at Section 13(1)(a). Table 4 shows that, on the whole, a higher percentage of halibut taken in the Pacific cod fisheries were of sub-legal size compared to the sablefish fisheries. For sablefish, the percentage of sub-legal halibut was greater for pot gear than for HAL gear.

For comparison, observers sampled 9,000 halibut in GOA catcher vessel fixed-gear fisheries from 2008 through 2016, 94% of which occurred in the Central or Western GOA. The only pot gear groundfish fishery in the GOA during those years was for Pacific cod, and 83% of those halibut were of sub-legal size (4,100 out of 4,950). The GOA HAL fisheries for sablefish and Pacific cod yielded 4,050 halibut samples – 1,522 in the sablefish HAL fishery and 2,538 in the Pacific cod HAL fishery. Sampled halibut bycatch in the GOA sablefish HAL fishery was 47% sub-legal, while sampled bycatch in the GOA Pacific cod HAL fishery was 72% sub-legal.

Table 4 Number of halibut (#fish) by size (cm) sampled by observers in BSAI sablefish and Pacific cod fixed-gear fisheries, 2008 through 2016

Target	Length (cm)	CV		CP		Grand Total
		POT	HAL	POT	HAL	
Sablefish	<81	638	8	25	15	686
	81-110	480	15	76	54	625
	111-140	25	2	5	19	51
	141-170		2		5	7
Sablefish Total		1,143	27	106	93	1,369
% Sub-legal		56%	30%	24%	16%	50%
PCod	<81	3,045	18	2,192	100,702	105,957
	81-110	143	1	210	11,561	11,915
	111-140	6		3	413	422
	141-170	1			56	57
	171-200				3	3
PCod Total		3,195	19	2,405	112,735	118,354
% Sub-legal		95%	95%	91%	89%	90%

Source: NMFS AFSC Observer Program, data compiled by AKFIN in Comprehensive_NORPAC.

4.4 Bycatch of other prohibited species

The Environmental Assessment for a proposed action that might increase the utilization of pot gear would consider impacts on prohibited species (PSC) such as crab and salmon. The NMFS Catch Accounting System (CAS) provides estimates of crab and salmon PSC in the sablefish fishery. CAS estimates of total PSC can be combined with observer data on the timing and location of sampled PSC to develop an

¹³ Partial-year data from 2017 is omitted from the table as it only included 11 samples from the sablefish fishery and 18 samples from the CV sector overall (sablefish and Pacific cod).

understanding of where and to what extent bycatch of a certain prohibited species is occurring and how that relates to the patterns of the sablefish pot fishery. For a snapshot of CAS data on PSC in the sablefish fishery, the reader can refer to Table 3.7 on page 390 of the 2016 Sablefish SAFE report chapter. That report breaks out the sablefish fishery by BSAI and GOA, and further divides each area by HAL gear and “other” gear. “Other” includes both pot and trawl, which are combined to meet confidentiality requirements as a result of the low number of sablefish pot vessels. The SAFE report covers 2012 through September 2016. For crab species, it includes bairdi, golden king crab, opilio, and red king crab. Roughly 96% of the total crab PSC taken by the “other” gear category in the BSAI was golden king crab (13,299 out of 13,851 animals). The table in the SAFE report clearly demonstrates that pot and trawl gear encounter far more crab PSC than does HAL gear (13,851 crab in “other” versus 377 crab in HAL). A full analysis could expand the time frame of the report or find other methods so that a specific number can be presented for BSAI pot gear.

The Council will also need to consider whether a proposed action might adversely impact blue king crab in the Pribilof Islands Habitat Conservation Zone (PIHCZ). The PIHCZ is established in regulation at Section 679.22(a)(6), and closes the area shown in Figure 2 to all directed fishing for groundfish using trawl gear, and directed fishing for Pacific cod using pot gear. Pribilof Island blue king crab are overfished and experienced overfishing in 2016, per a letter to the Council from NMFS dated September 29, 2016. The letter states that bycatch in the BSAI groundfish fisheries caused the overfishing in 2016, and proposes that NMFS will use its in-season management authority to make precise closures to BSAI fisheries that use bottom contact gear if the blue king crab stock approaches its acceptable biological catch (ABC) limit. The agency might request that the Council analyze whether the PIHCZ regulation should be amended to also prohibit pot gear used to fish for sablefish IFQ in that area.

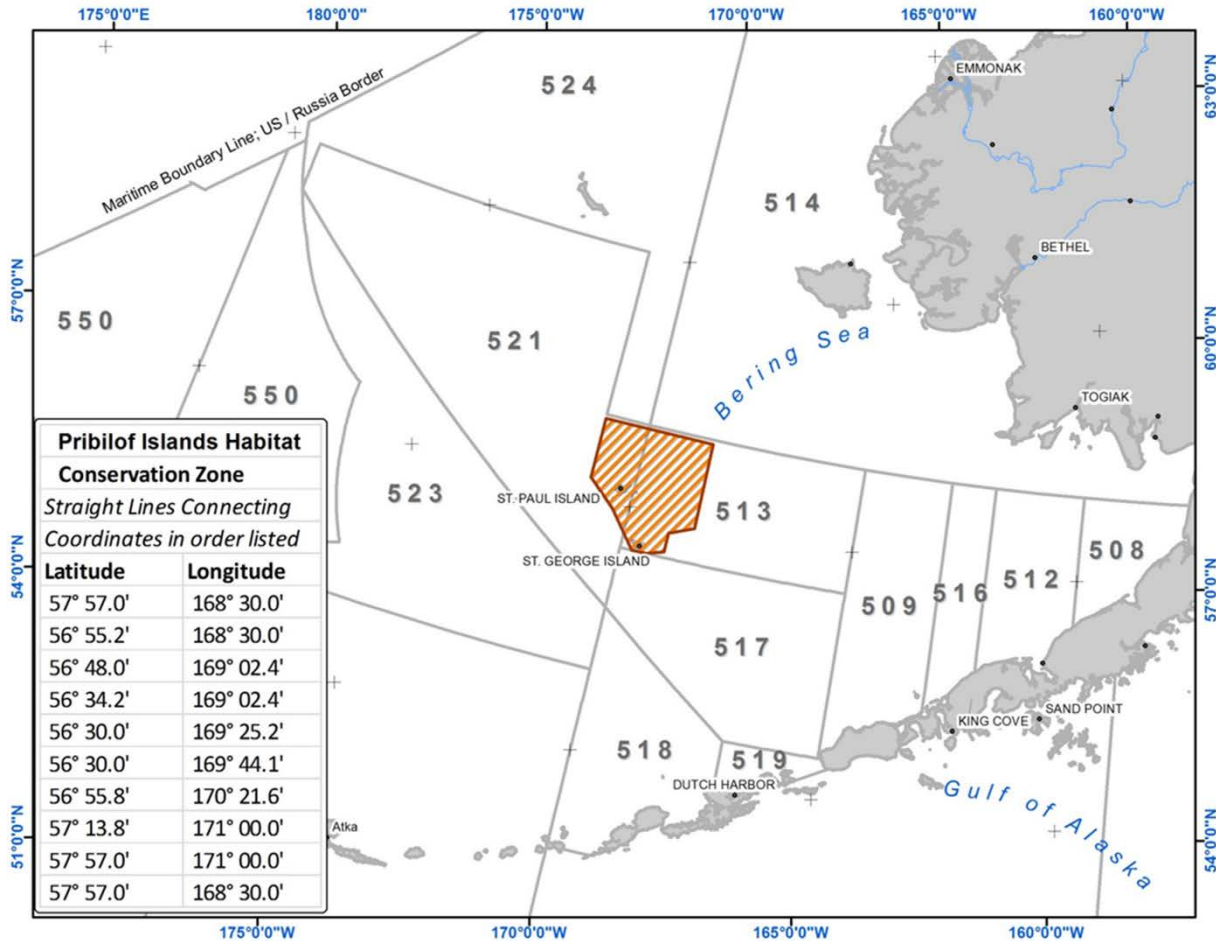


Figure 2 Pribilof Islands Habitat Conservation Zone (Figure 10 to CFR 679)

5 Background on whale depredation in Western Alaska

Depredation by killer whales and sperm whales is common in the Alaska sablefish IFQ fishery (Sigler et al. 2008, Peterson et al. 2017). Whale depredation reduces catch rates and decreases the accuracy of fish stock assessments. Killer whale depredation generally occurs in the BS, AI, and WGOA management areas, whereas sperm whale depredation tends to be more problematic in the Central and Eastern GOA (Figure 3, Figure 4, and Table 5). Killer whale depredation occurs where high-value longline fisheries overlap with regions supporting some of the greatest densities of “fish-eating” or resident killer whales in the world (Forney and Wade 2006, Fearnbach 2012). Killer whales depredate on several groundfish species that are caught on longline gear in Western Alaska, including sablefish, Greenland turbot, arrowtooth flounder and Pacific halibut (Yano and Dalheim 1995, Peterson et al. 2013). The most recent population estimate for resident killer whales in the Alaska region was placed at 1,475 individuals in 2013 (D. Hanselman, pers. comm. 2017). Table 5 shows that killer whales in the BS, AI, and WG have continued to depredate on the AFSC longline survey at similar or higher levels than they did during the years covered in the 2013 stock estimate. Resident killer whales in Western Alaska show strong long-term associations consistent with a matrilineal pattern and have been shown to exhibit a high degree of site fidelity over time, with ranges generally limited to around 200 km (Ford and Ellis 2006, Forney and

Wade 2006, Fearnbach, 2012). Observer data from the Western GOA and BSAI sablefish fishery show that the gross amount of depredated sablefish has decreased in recent years, but that decrease is attributed to reduced fishing effort as a result of lower sablefish stock density and the ongoing costs that vessels face when fishing around resident whales. Vessels that continue to fish in Western Alaska waters experienced a proportion of depredated longline sets near an all-time high in 2016 (D. Hanselman, pers. comm. 2017).

In 2013, Peterson et al. used NMFS longline survey data to explore spatial and temporal trends in killer whale depredation and to quantify the effect of killer whale depredation on catches of groundfish species in the BS, AI, and WGOA. When killer whales were present during survey gear retrieval, whales removed an estimated 54 percent to 72 percent of sablefish, 41 to 84 percent of arrowtooth flounder and 73 percent of Greenland turbot. Overall sablefish catches (depredated and non-depredated sets) were lower by between 11 percent and 29 percent in all three management areas. During the study period, the frequency of killer whale interactions remained stable in the BS while increasing in the AI and WG.

In a follow-up studies in 2014 and 2017, Peterson et al. extended their analysis to evaluate the impacts of killer whale depredation on commercial longline fisheries in Western Alaska. Those studies applied a statistical modeling approach to NMFS observer data and fishermen-collected depredation data to: (1) estimate the frequency of killer whale depredation on commercial longline fisheries; (2) estimate depredation-related catch per unit effort reductions; and (3) assess direct costs and opportunity costs incurred by commercial longline fleets in Western Alaska as a result of killer whale interactions. The percentage of commercial fishery sets affected by killer whales was highest for sablefish in the BS (21 percent) and was relatively low in the AI and WGOA (~2 percent). On depredated sets, sablefish catch per unit effort (CPUE) reductions associated with depredating killer whales ranged from 46 to 69 percent, compared to 24 to 29 percent for sperm whales. The 2017 study estimated that total sablefish catch removals by killer whales in the Alaska management area during the 1995 to 2014 period totaled between 1,251 and 2,407 tons, while sperm whale removals from 2001 to 2014 totaled between 482 and 1,040 tons. When these impacts were factored into the 2016 sablefish stock assessment, the result was a 1% reduction in the recommended sablefish harvest limit.

In direct response to depressed CPUEs associated with killer whale depredation, commercial longline fishermen reportedly react in two ways: dropping their gear back down to “wait the whales out,” or moving to a different fishing site to avoid the whales (Peterson and Carothers 2013). Both of these avoidance measures result in reduced efficiency through increased operation costs and opportunity costs in lost time (extended soak times and distances traveled). Fishermen operating in western Alaska reported waiting on average at least 12 hours and/or transiting 25 miles or more to avoid depredating killer whales (Peterson and Carothers 2013). These depredation avoidance measures can be costly for commercial longliners as fishermen are forced to travel farther and stay on the grounds longer to catch the same amount of IFQ. In a study conducted with six longline vessels operating in Western Alaska in 2011 and 2012, killer whale depredation resulted in an estimated additional \$980 per vessel-day for additional fuel, crew food and the opportunity cost of lost time. Based on data from the observed commercial fishery, the additional costs associated with catching the same amount of fish on sets depredated by killer whales was estimated to be approximately \$433 (\pm \$147) per set for additional fuel alone. That estimate does not include additional crew time, bait or opportunity costs in other fishing or non-fishing activities (Peterson et al. 2014).

Table 5 Count of stations where sperm (S) or killer whale (K) depredation occurred in the six sablefish management areas. The number of stations sampled that are used for relative population calculations are in parentheses. Areas not surveyed in a given year are left blank. If there were no whale depredation data taken, it is denoted with an "n/a."

Year	BS (16)		AI (14)		WG (10)		CG (16)		WY (8)		EY/SE (17)	
	S	K	S	K	S	K	S	K	S	K	S	K
1996			n/a	1	n/a	0	n/a	0	n/a	0	n/a	0
1997	n/a	2			n/a	0	n/a	0	n/a	0	n/a	0
1998			0	1	0	0	0	0	4	0		0
1999	0	7			0	0	3	0	6	0	4	0
2000			0	1	0	1	0	0	4	0	2	0
2001	0	5			0	0	3	0	2	0	2	0
2002			0	1	0	4	3	0	4	0	2	0
2003	0	7			0	3	2	0	1	0	2	0
2004			0	0	0	4	3	0	4	0	6	0
2005	0	2			0	4	0	0	2	0	8	0
2006			0	1	0	3	2	1	4	0	2	0
2007	0	7			0	5	1	1	5	0	6	0
2008			0	3	0	2	2	0	8	0	9	0
2009	0	10			0	2	5	1	3	0	2	0
2010			0	3	0	1	2	1	2	0	6	0
2011	0	7			0	5	1	1	4	0	9	0
2012			1	5	1	5	2	0	4	0	3	0
2013	0	11			0	2	2	2	3	0	7	0
2014			1	3	0	4	4	0	6	0	4	0
2015	0	9			0	5	6	0	6	0	7	0
2016			1	0	0	3	3	0	6	0	5	0

Source: D. Hanselman, C. Lunsford, C. Rodgveller, and M. Peterson. December 2016. BSAI and GOA SAFE, Chapter 3: "Assessment of the Sablefish Stock in Alaska, Table 3-11" p. 398.

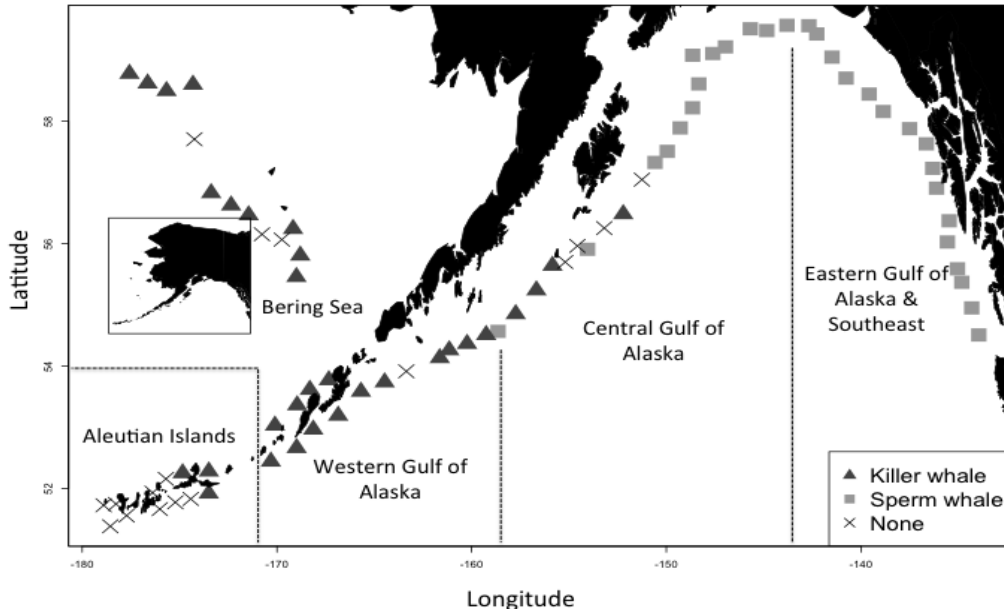


Figure 3 Depredation by whale species and sablefish management area based on NMFS longline survey, 1998-2011. NMFS longline survey locations mirror commercial longline fishing grounds along the continental slope (Peterson and Carothers, 2013).

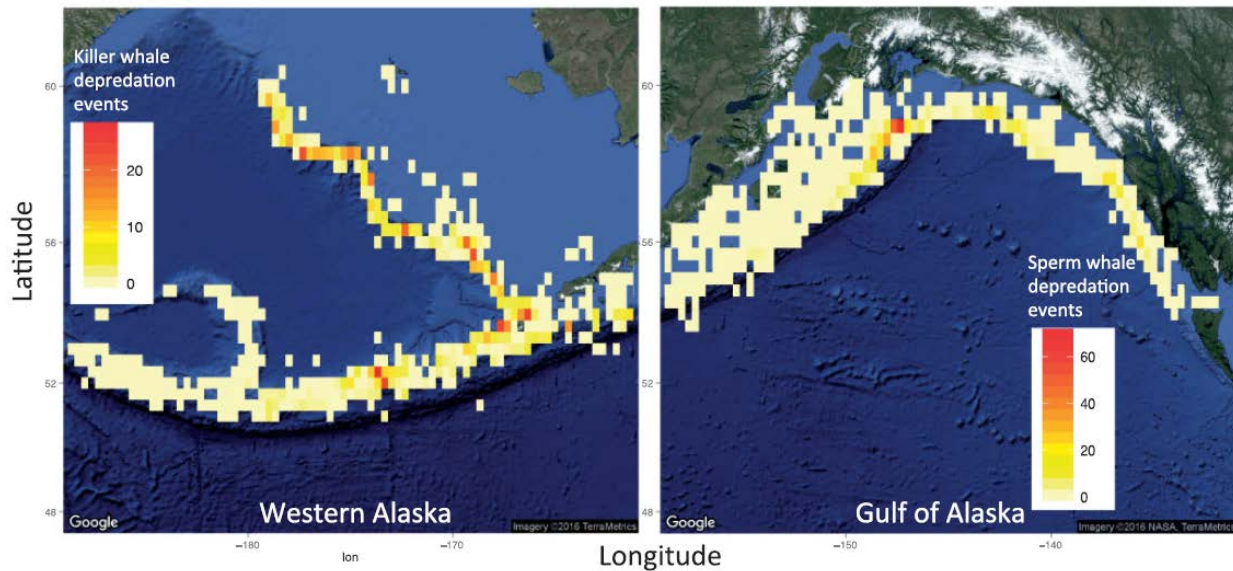


Figure 4 NMFS observer data on depredation events counts by killer whales in western Alaska and sperm whales in the GOA, shown in 1/3-degree by 1/3-degree cells (Source: Peterson and Hanselman, 2017)

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