Environmental Assessment / Final Regulatory Impact Review

For Amendment 101 to the Fishery Management Plan For Groundfish of the Gulf of Alaska

Allow the Use of Pot Longline Gear in the Gulf of Alaska Sablefish Individual Fishing Quota Fishery

October 2016

Abstract: This analysis of management measures applies exclusively to the sablefish (*Anoplopoma fimbria*) Individual Fishing Quota (IFQ) fishery in the Gulf of Alaska (GOA). The considered measures include: (1) redefine legal gear to include pot longline gear, subject to a pot limit enforced by pot-identification tags, (2) require that pot longline gear be moved or tended within a certain amount of time after being set, or removed from the fishing grounds when making a sablefish delivery, (3) require marking of pot longline gear, and (4) require retention of Pacific halibut (*Hippoglossus stenolepis*) if sufficient IFQ is held by fishermen to cover the halibut IFQ caught using pot longline gear.

The action would minimize whale and seabird interactions with fishing gear, and adverse impacts on the sablefish IFQ fleet from depredation by sperm whales (*Physeter macrocephalus*) and killer whales (*Orcinus orca*). Depredation negatively impacts the sablefish IFQ fleet through reduced catch rates and increased operating costs. Depredation also has negative consequences for the whales through increased risk of vessel strike, gear entanglement, and altered foraging strategies. An additional management concern stems from the impact that whale depredation may have on the accuracy of fish stock abundance indices.

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List of Acronyms and Abbreviations

AAC	Alaska Administrative Code
ABC	acceptable biological catch
ASR	acoustic startle response
ADF&G	Alaska Department of Fish and Game
AFSC	Alaska Fisheries Science Center
AKFIN	Alaska Fisheries Information Network
AIS	Automatic Identification System
ALFA	Alaska Longline Fishermen's Association
BSAI	Bering Sea and Aleutian Islands
C	Central
CAS	Catch Accounting System
CBSFA	Central Bering Sea Fishermen's Association
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
COAR	Commercial Operators Annual Report
Council	North Pacific Fishery Management Council
CP	catcher/processor
CPUE	catch per unit effort
CV	catcher vessel
DMR	discard mortality rate
E	East
E.O.	Executive Order
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EFH	essential fish habitat
EIS	Environmental Impact Statement
ESA	Endangered Species Act
ESU	Evolutionarily significant unit
FMP	fishery management plan
FONSI	Finding of No Significant Impact
FR	*Federal Register*
GOA	Gulf of Alaska
HAL	Hook-and-Line
IFQ	Individual fishing quota
IPHC	International Pacific Halibut Commission
IRFA	Initial Regulatory Flexibility Analysis
lb(s)	pound(s)
LOA	length overall
LEI	Long-term Effect Index
m	meter or meters
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act

MMPA	Marine Mammal Protection Act
MRA	maximum retainable amount
MSST	minimum stock size threshold
mt	metric ton
MXAK	Marine Exchange of Alaska
NAO	NOAA Administrative Order
NEPA	National Environmental Policy Act
nm	nautical mile
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPFMC	North Pacific Fishery Management Council
Observer Program	North Pacific Groundfish and Halibut Observer Program
PAM	passive acoustical monitoring
PBR	potential biological removal
PSC	prohibited species catch
PNOL	Prior Notice of Landing
PSEIS	Programmatic Supplemental Environmental Impact Statement
QS	quota share
RFA	Regulatory Flexibility Act
RFFA	reasonably foreseeable future action
RFID	radio-frequency identification
RIR	Regulatory Impact Review
SAFE	Stock Assessment and Fishery Evaluation
SAR	Stock Assessment Report
SBA	Small Business Act
Secretary	Secretary of Commerce
SEO	Southeast Outside
SEASWAP	Southeast Alaska Sperm Whale Avoidance Program
SIR	Supplemental Information Report
TEC	Transfer Eligibility Certificate
TAC	total allowable catch
U.S.	United States
USCG	United States Coast Guard
VMS	Vessel Management System
W	West
WY	West Yakutat

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Executive Summary

This document analyzes proposed management measures that would apply exclusively to the Individual Fishing Quota (IFQ) fishery in the Gulf of Alaska (GOA) for sablefish (*Anoplopoma fimbria*), also known as black cod. A proposed FMP and regulatory amendment would allow the use of pot longline gear for the sablefish IFQ fishery in the GOA. The considered measures include: (1) redefine legal gear to include pot longline gear, potentially subject to a pot limit enforced by pot-identification tags, (2) require that pot longline gear be moved or tended within a certain amount of time after being set, or removed from the fishing grounds when making a sablefish delivery, (3) require marking of pot longline gear, and (4) require retention of Pacific halibut (*Hippoglossus stenolepis*) if sufficient IFQ is held by fishermen to cover both the sablefish and halibut IFQ caught using pot longline gear.

Purpose and Need

The purpose of this action is to reduce interactions between the sablefish fishery and sperm and killer whales. Currently, sperm and killer whales depredate upon sablefish caught in hook-and-line gear.

The Council adopted the following purpose and need statement in December 2014, and affirmed it when taking final action in April 2015.

> *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.*

Alternatives

The Council's preferred alternative, defined in April 2015, is indicated in **bold**.

Alternative 1 (No Action). Status Quo (hook-and-line gear is the only legal gear type for sablefish IFQ in the GOA).

Alternative 2 (Preferred). Allow the use of pot longline gear in the GOA Sablefish IFQ fishery.

Element 1. 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

Option 1. Require the location of pots set, left, or lost on the grounds to be submitted to an electronic database when in the water.

Option 2. 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

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 longline pot fishery under the requirements of regulations implementing this program.

Additionally, all vessels using longline pot 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.

A review of the effects of allowing GOA sablefish longline pot gear will be conducted 3 years after implementation. NMFS is requested to include pot gear effort information in their management report to the Council.

Environmental Assessment

The proposed action to allow a new gear type to harvest sablefish (and possibly incidental amounts of halibut) IFQ in the GOA is limited in scope and will not likely affect all environmental components of the GOA. No effects are expected on the physical environment, habitat, other ecosystem component species, and ecosystem components of the environment because current harvest limits and current protection measures as described in previous NEPA documents would not be changed by either of the alternatives. The potentially affected resource components are: sablefish, halibut, other groundfish, marine mammals (specifically, sperm and killer whales), seabirds, and socioeconomics. The effects of the alternatives on these components would be caused by: (1) increased efficiency in harvesting sablefish and halibut IFQ: (2) decreased unaccounted mortality of sablefish (and potentially other fish species) that are lost to whale depredation during IFQ fishing; and (3) potential decrease in whale and seabird interactions (i.e., entanglements) with pot longline gear in the GOA, as compared to the status quo fishing exclusively with hook-and-line (HAL) longline gear. No increase in sablefish or halibut catches would occur, as those fisheries are managed under the Individual Fishing Quota Program For Fixed-gear Pacific Halibut and Sablefish Fisheries Off Alaska (IFQ Program) and those harvests are effectively capped. The socioeconomic environment may be affected by increased efficiency in harvesting sablefish IFQ (e.g.,

catch per unit effort, reduced fuel/bait costs, reduced opportunity costs), but could also be affected by the redistribution of effort among members of the existing harvest fleet.

Table ES-1 Criteria used to determine significance of effects on sablefish and halibut

Effect	Criteria			
	Significantly Negative	Not Significant	Significantly Positive	Unknown
Stock Biomass: potential for increasing and reducing stock size	Changes in fishing mortality are expected to jeopardize the ability of the stock to sustain itself	Changes in fishing mortality are expected to maintain the stock's ability to sustain itself	Changes in fishing mortality are expected to enhance the stock's ability to sustain itself	Magnitude and/or direction of effects are unknown
Fishing mortality	Reasonably expected to jeopardize the capacity of the stock to yield sustainable biomass on a continuing basis.	Reasonably expected not to jeopardize the capacity of the stock to yield sustainable biomass on a continuing basis.	Action allows the stock to return to its unfished biomass.	Magnitude and/or direction of effects are unknown
Spatial or temporal distribution	Reasonably expected to adversely affect the distribution of harvested stocks either spatially or temporally such that it jeopardizes the ability of the stock to sustain itself.	Unlikely to affect the distribution of harvested stocks either spatially or temporally such that it has an effect on the ability of the stock to sustain itself.	Reasonably expected to positively affect the harvested stocks through spatial or temporal increases in abundance such that it enhances the ability of the stock to sustain itself.	Magnitude and/or direction of effects are unknown

Sablefish

Continued use of currently allowed gear would not decrease fishing mortality on sablefish, as hooked fish would continue to be depredated upon by whales; efforts to better quantify this mortality are being developed by the stock assessment authors. While unknown, mortality of sablefish by whales on hook-and-line gear is gauged to be on the order of a few hundred tons, and might be increasing in certain areas. Whale predation is estimated to occur on 5 percent to 10 percent of HAL sets, but could be as high as 30 percent to 40 percent on an individual set of longline gear. Generally, sperm whale depredation occurs in the Central GOA (CGOA) and Eastern GOA (EGOA), while killer whale depredation tends to be more prevalent in the Western GOA (WGOA). Taking no action would not address the stated purpose and need for the action. The Council has identified the need to maximize the ability of sablefish QS holders to harvest their sablefish IFQ by increasing catch per unit of effort and reducing costs that are associated with whale avoidance; this concern is further addressed in the RIR.

Alternative 2 would allow, but not require, harvesters to use pot longline gear in the sablefish IFQ fishery in the GOA. There are no significant impacts identified for sablefish. Some (unquantified) benefit would occur under Alternative 2. Unaccounted fishing mortality due to whale depredation would be reduced as some sablefish IFQ fishermen voluntarily switch from HAL longline gear to pot longline gear, but that effect would be masked by recent lack of recruitment to the stock. Additional savings in lost mortality would accrue to species also caught by sablefish IFQ fishermen using HAL gear, such as grenadiers and Pacific halibut.

Pacific Halibut

The sablefish and halibut IFQ fisheries are prosecuted simultaneously and harvests of both fish may be landed together, as long as sufficient IFQ are held by those on board to cover those harvests. Taking no action would not address the stated purpose and need for the action. Without Element 4, all halibut would continue to be discarded if caught with pot longline gear. Such a requirement is in conflict with one of the

tenets of the IFQ Program, which is to allow fishermen to retain all legal fish of both species if sufficient IFQ are held to cover that harvest.

The Council has identified the need to maximize the ability of sablefish QS holders to harvest their sablefish IFQ by increasing catch per unit of effort and reducing fishing costs. The Council did not, however, identify management measures to limit halibut IFQ retention to *incidental* amounts as suboptions for analysis under Alternative 2, Element 4. The impacts identified for halibut will depend on the magnitude of sablefish IFQ effort switched from HAL longline to pot longline gear. If whale depredation decreases, some (unquantified) benefit would occur under Alternative 2, Element 4. The incidental mortality of halibut due to whale depredation is not explicitly accounted for in stock assessment models because a time series of total annual whale depredation does not exist. The stock assessment model implicitly represents whale depredation losses as a reduction in the overall stock productivity. For example, increasing trends in whale depredation rates would be reflected as decreasing trends in stock productivity. Halibut discard mortality would continue to occur for those halibut not allowed to be retained. This mortality could accrue from three scenarios: (1) when no halibut may be retained in sablefish pot longline gear, and (2) when halibut cannot be retained because no permit holder onboard the vessel possesses sufficient halibut IFQ, and (3) when sublegal-size halibut must be discarded. The requirement to discard under 32 inch length halibut would continue.

Marine Mammals

Table ES-2 Criteria for determining significance of impacts to marine mammals

	Incidental take and entanglement in marine debris	Prey availability	Disturbance
Adverse impact	Mammals are taken incidentally to fishing operations or become entangled in marine debris.	Fisheries reduce the availability of marine mammal prey.	Fishing operations disturb marine mammals.
Beneficial impact	Decreased fishery interactions with fishing gear can be identified.	Availability of prey from fishing operations may provide additional, readily accessible, sources of food.	Decreased fishery interactions with fishing gear can be identified.
Significantly adverse impact	Incidental take is more than Potential Biological Removal (PBR) or is considered major in relation to estimated population when PBR is undefined.	Competition for key prey species likely to constrain foraging success of marine mammal species causing population decline.	Disturbance of mammal is such that population is likely to decrease.
Significantly beneficial impact	No threshold can be identified.	Food availability increased substantially from baseline such that whale population levels, survival, or reproduction success is likely to increase.	Not applicable
Unknown impact	Insufficient information available on take rates.	Insufficient information as to what constitutes a key area or important time of year.	Insufficient information as to what constitutes disturbance.

A quantitatively unknown, but positive, effect is expected from allowing the use of pot longline gear in the GOA sablefish IFQ fishery, when compared with the status quo. Sperm whales and killer whales that depredate on longline fishing gear could be negatively impacted. Removing hooked sablefish from longline gear does not represent natural foraging for either whale species. Sperm whales and killer whales that depredate on HAL gear may be at greater risk of vessel strike and/or entanglement in fishing gear. If the sablefish IFQ fishery switches to pot longline gear, there will likely be decreased interactions between killer whales and sperm whales and the sablefish fishery. This action would lead to a decrease in disturbances and likelihood of entanglements beyond those resulting from current avoidance techniques

used by fishermen. Overall, Alternative 2 is expected to result in beneficial impacts on killer whales and sperm whales compared with the status quo.

Seabirds

Table ES-3 Criteria for determining significance of impacts on seabirds

	Incidental take	Prey availability
Insignificant	No substantive change in takes of seabirds during the operation of fishing gear.	No substantive change in forage used by seabirds.
Adverse impact	Non-zero take of seabirds by fishing gear.	Reduction in forage fish populations, or the availability of forage fish, to seabird populations.
Beneficial impact	Decreased fishery interactions with fishing gear can be identified.	Availability of offal from fishing operations may provide additional, readily accessible, sources of food.
Significantly adverse impact	Trawl and hook-and-line take levels increase substantially from the baseline level, or level of take is likely to have population level impact on species.	Food availability decreased substantially from baseline such that seabird population level survival or reproduction success is likely to decrease.
Significantly beneficial impact	No threshold can be identified.	Food availability increased substantially from baseline such that seabird population level, survival, or reproduction success is likely to increase.
Unknown impacts	Insufficient information available on take rates or population levels.	Insufficient information available on abundance of key prey species or the scope of fishery impacts on prey.

A continued prohibition on the use of pot longline gear in the GOA would not minimize potential fishery interactions with seabirds. The longline fleet has traditionally been responsible for about 91 percent of the overall fisheries-related seabird mortality in Alaska. Of special concern is the endangered Short-tailed Albatross (*Phoebastria albatrus*). Fishing vessels in the GOA encounter seabirds (e.g. albatrosses, fulmars, gulls, shearwaters) during the course of fishing. These interactions can result in direct mortality for seabirds if they become entangled in fishing gear or strike the vessel or fishing gear while flying. Interactions with longline fisheries are of particular concern, as seabirds are attracted to sinking baited hooks and can become hooked and drowned. A transition from HAL gear to pot longline gear is expected to reduce seabird interactions and decrease the likelihood of incidental takes of seabirds, which is viewed as a beneficial outcome of the proposed action. These decreased fishery interactions likely result from decreased prey availability. While decreased prey availability may negatively impact seabirds in the short run because they must return to natural predatory behavior, it benefits their survival in the long run due to decreased opportunities for entanglements (potentially those resulting in injuries and drownings).

Cumulative Effects

Three reasonably foreseeable future actions are identified as likely to have an impact on a resource component within the considered action area and timeframe. First, the Council is considering a regulatory amendment that would allow the retention of halibut IFQ in pot longline gear in halibut regulatory area 4A (BS and AI areas). Second, the Council will be considering a proposal that would allow commercial halibut IFQ holders to voluntarily sell quota to the charter sector. If that is permitted, there could be marginally less halibut IFQ held on vessels fishing for sablefish with pot longline gear. Alternative 2 (Element 4) of the action considered in this analysis would allow retention of halibut in pot longline gear if sufficient IFQ is held on the vessel; therefore, the reasonably foreseeable future actions (RFFA) highlighted in this paragraph could lead to instances of additional halibut discards. This impact is not likely to be significant, as one would not expect an individual to voluntarily transfer away halibut that they need to cover their targeted sablefish activity. Third, the Council is developing a GOA trawl bycatch

management program that, if implemented, could have cumulative effects on the communities that are involved in the GOA sablefish fishery. The impacts of a management regime change in the trawl fishery cannot be predicted until the nature of the program is fully defined. However, one element of that program could potentially lower halibut PSC limits for the trawl fishery. If so, the directed hook-and-line fishery for halibut, in which many sablefish fisherman participate, could experience a positive effect. Also, the Council recommended reduced halibut PSC limits in the Bering Sea and Aleutian Islands (BSAI) fisheries, which could have a similar effect. NMFS published a final for the reduced halibut PSC limits on April 27, 2016 (81 FR 24714). Viewed in the opposite direction, reduced halibut mortality from whale depredation on HAL, through the use of pot longline gear, could marginally increase the amount of halibut that could be encountered in trawl fisheries. Considering the direct and indirect impacts of the proposed action when added to the impacts of past and present actions previously analyzed in other documents that are incorporated by reference and the impacts of the reasonably foreseeable future actions listed above, the cumulative impacts of the proposed action are determined to be not significant.

Regulatory Impact Review

Alternative 1

Depredation on sablefish HAL sets is known to occur in the BSAI and GOA IFQ fisheries, and is a major cost to the sablefish IFQ fishery. Fishermen endure lost catch, spend time waiting out whales in the area before hauling gear, or spend time and fuel relocating to avoid whales. Measures taken to avoid depredation reduce fishing efficiency through variable operational costs (fuel, labor) and through the opportunity cost of time lost that would have been available for additional fishing effort or dedicated to other fishing and non-fishing activities. Because the sablefish IFQ fishery is quota-based, the key cost of depredation to fishermen is the cost of the additional time and bait required to catch the same amount of fish. Gear damage from depredation is also a direct cost. In a study conducted with six longline vessels operating in the WGOA and BSAI areas during 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 sablefish on killer whale depredated sets was estimated to be approximately $433 (± $147) per set for additional fuel alone (not including additional crew, bait or opportunity costs). The estimated reduction in CPUE for depredated sets in that area ranged between 35 percent and 69 percent for observed sets during the time period from 1998 through 2012. Estimated fuel costs associated with those sets were 82 percent higher. A study published in 2014, estimated opportunity costs of time lost to fishing at $522 per vessel-day.

Use of pot gear in areas where it is permitted has increased in recent years, at least in part due to depredation concerns. In 2007, pot gear accounted for 81 percent of the BS fixed gear IFQ catch and 56 percent of the AI catch.

Alternative 2

The use of pot longline gear in the GOA sablefish IFQ fishery would be consistent with the allowance of pot gear in the BSAI sablefish IFQ fisheries. The purpose and need statement for this action outlines three first-order considerations for weighing the action alternative against the status quo. First, the Council is seeking an alternative that would mitigate the reduced CPUE and increased fishing costs (direct and indirect) that are attributed in part to whale depredation off of HAL gear. Second, the Council acknowledges that depredation off of HAL gear constitutes unaccounted mortality in the sablefish stock. Mortality from whale depredation is a direct negative impact on the sablefish stock, but the inability to account for this mortality (assumed to be greater than natural sablefish mortality due to whale predation) increases uncertainty in the sablefish abundance indices that are critical to sound management. Third, the Council is seeking an alternative that would provide continued, equitable fishing opportunities for

harvesters who do not choose to switch to pot longline gear, minimizing the likelihood and severity of excessive grounds preemption, gear conflicts, and consolidation in the GOA sablefish IFQ fleet.

The Council and stakeholder committees have noted potential benefits of pot gear for sablefish fishing that include: mitigation of marine mammal interactions, reduced incidental take of seabirds, reduced bycatch of non-target fish species, reduced overall halibut mortality, and better accounting of total sablefish fishing mortality.

The potential economic and social costs of allowing pot longline gear in areas where HAL gear is also used include: the capital cost of purchasing pot longline gear and/or reconfiguring a vessel, increased preemption of fishing grounds, gear conflict potentially resulting in gear damage or loss, and competitive imbalance between users of different gear types.

In some aspects, the relative benefit of fishing with pot longline gear as opposed to HAL gear is either unclear or is conditional on factors that are not forecasted in this analysis. Those external factors include the local biomass distribution of sablefish in the future, changes in future product markets, and the future behavior of marine mammals (particularly depredating whales). Based on available information, the analysts are not able to definitively state whether fishing with pot longline gear would generate a higher sablefish CPUE in the GOA (noting that CPUE is likely to differ across GOA subareas), whether fishing with pot longline gear will increase or decrease per unit ex-vessel values for sablefish, or whether fishing with pot longline gear will reduce expenditures on bait, fuel, and travel time to and between fishing grounds.

It is possible 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 longline gear safely or practicably, or because they cannot afford the cost of acquiring pot longline gear and reconfiguring their fishing platform. Vessel owners with higher fishing revenues or greater capital assets would find it easier to secure financing. IFQ crewmen who own sablefish QS, but not a vessel, may find it more difficult to move up to vessel ownership if jumping up all the way to a vessel capable of fishing pot longline gear becomes the only viable way to fish sablefish IFQ in the GOA. Vessels that already fish pots in other fisheries, such as the Pacific cod fishery, could face much lower conversion costs than the small boat fleet. On an area basis, the Southeast Alaska fleet would likely face the longest build-up period in establishing pot longline gear operations. Vessels that can safely carry more pot longline gear would have a competitive advantage and might impose costs on other vessels by preempting more of the sablefish fishing grounds.

If fishing sablefish IFQ with pot longline gear emerges as a dominant strategy, perhaps concentrating depredation by whale populations onto remaining HAL gear, direct costs and opportunity costs for non-pot participants could increase relative to the status quo. In the extreme, fishing with HAL gear could become less profitable. If operating margins for non-pot participants fall below the profitability threshold, vessel owners could choose to forgo the cost of operating their own vessel and "walk on" to vessels able to fish pot longline gear, thus reducing the number of active vessels in the fleet. Operators unable to convert to pot longline gear might choose to sell their QS, which could also lead to consolidation in the fleet. Fleet consolidation would be the most imminent threat to the number of available crew jobs. Pot longline operations do not seem to have inherently more or fewer crew on board than do HAL vessels.

Presuming that the conversion of some of the GOA sablefish fleet to pot longline gear reduces unaccounted whale depredation, and consequently reduces uncertainty in sablefish stock abundance indices, future TAC levels may increase. Transfer prices for the QS that underlie annual sablefish IFQ are based on perception of the future harvest opportunities in the fishery, so higher TACs could have a positive effect on QS value. Current QS holders would benefit from the enhanced value of their tradable

asset, though individuals looking to purchase QS on the transfer market – such as new entrants, holders of small QS amounts, or crew members – might encounter higher barriers to entry.

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. If fleet consolidation occurs, some potential for the redistribution of catch exists. Sablefish caught with pot longline gear are not expected to be significantly larger or smaller, on the whole, than those caught with HAL gear. As a result, processors would not likely have to alter their mix of product forms to suit a different average sized fish. The impact of a shift to pot longline gear on delivered sablefish quality is not clear. If unaccounted whale depredation mortality decreases due to the use of pot longline gear, processors could benefit from increased TACs in the same manner as harvesters. However, marginal returns may be diminishing with increased sablefish production. Nominal average annual ex-vessel prices for sablefish in all areas have been in decline since their peak in 2011. Ex-vessel prices have many determinant factors in addition to the quantity supplied to the market. Nevertheless, one might conclude that demand for sablefish on the world market is not ever-expanding.

Potential impacts on communities follow the same logic as those described for processors. If significant fleet consolidation were to occur, communities that rank highly in processor reliance but not in processor engagement (i.e. the community receives a small amount of deliveries, but that activity makes up a significant portion of the community's economic activity) would be among the most at risk. Those communities include Elfin Cove, Port Alexander, Akhiok, Excursion Inlet, and False Pass. GOA communities with shipyard operations might benefit from the removal of pot gear restrictions, as vessels may need to be re-fitted or modified in order to carry, launch, and haul pot longline gear.

Net Benefits Summary

Two general outcomes are possible under the proposed action, each of which would have different net benefit impacts. The first possible outcome is that HAL gear remains the only legal gear for the harvest of GOA sablefish IFQ. Net benefits would not change from the status quo under this outcome. The IFQ fishery continues to operate in its current manner: whale depredation would continue to impose direct and opportunity costs on IFQ fishermen, and HAL bycatch of other groundfish species would be unchanged from their present rates. The rate of incidental take of seabirds would also be unchanged. The second possible outcome is that pot longline gear would be permitted in the GOA sablefish IFQ fishery, but would not be required. Given the diversity in the size of the vessels and the resources of the vessel owners in the fleet, it is likely that the fishery will be prosecuted with two different gear types deployed in the same management areas.

The likely benefits of replacing some HAL effort with pot longline effort are aligned with the Council's purpose and need for this action. Specifically, restricting access to sablefish and other fish hooked on HAL gear should reduce vessel and gear interactions with marine mammals and incidental take of seabirds . Marine mammals and seabirds would experience a marginal benefit, in which the Council has expressed an interest, and those sablefish IFQ harvesters who use pot longline gear will have mitigated the depredation events that depress their CPUE. Bycatch of fish species that are commonly taken with HAL gear, but encountered less often with pot gear (e.g., rockfish, skates) would decrease in the aggregate. More of those bycatch species would be available to other directed fisheries, benefitting sablefish IFQ participants who are active in those fisheries, as well as subsistence and recreational users. The amount of sablefish that are depredated off of HAL gear without being accounted in stock abundance indices would decrease as less HAL gear is deployed, thereby improving stock management and potentially leading to greater harvestable biomass in future time periods.

Participants who are not able to fish pot longline gear on their vessels – due to either financial or operational constraints – would not experience the same benefit of reduced whale depredation. In fact, it is possible that they would experience greater rates of depredation as the sablefish hooked on HAL gear becomes concentrated on fewer vessels in a given area. Therefore, some distributional impacts are likely to result from the action alternative; those impacts are likely to affect smaller vessels in the sablefish IFQ fleet, though some large vessels will also find it difficult to convert to pot longline gear. Furthermore, allowing both gear types to be fished in the same areas would increase the likelihood of gear conflicts in which the more lightly constructed HAL gear is at risk of damage or loss, as empirical experience gained in the 1980s, when sablefish pot longlines were permitted in the GOA, revealed.

Because pot longline fishing for sablefish has not been permitted in the GOA during the existing IFQ management regime, the analysis lacks some information that would allow for a definitive assessment of whether or not fishing pot longline gear will actually generate greater net benefits. GOA data on sablefish catch rates with pot longline gear, and ex-vessel prices for pot-caught sablefish are not available. On the other hand, it is known that fitting a vessel with pot longline gear will be costly. Lacking that information, it is not clear that investments in setting up a pot longline operation will return a net benefit in the form of reduced gear damage and reduced opportunity costs incurred when avoiding whale depredation.

Based on the analysis and criteria under E.O. 12866, some distributional impacts among the various participants is likely. Precisely what, when, and how great these impacts might be is an empirical question. The qualitative benefits of reduced whale and seabird interactions are likely to be achieved under the action alternative. The balance of benefits between pot longline and HAL sablefish fishermen is, at this point, less obvious due to limited data.

Management and Enforcement Considerations

Given that the Council has selected the action alternative (Alternative 2) as its preferred alternative, NMFS recommends revising and adding Federal regulations for management, monitoring, and enforcement of the fishery. Draft regulations to authorize Alternative 2 are outlined to include regulatory area, since the preferred alternative makes area-specific distinctions under some of the Elements under Alternative 2. A limitation on the number of pots a vessel could deploy during a fishing trip (Element 1) would require mandatory logbooks on all vessels participating in a pot longline fishery. The option to require each pot to be individually tagged (Element 1, Option 1) would be implemented with a new pot tag program to register, issue, monitor, and enforce pot tags. NMFS did not develop regulations to require the locations of pots deployed in a pot longline fishery to be entered in an electronic database (Element 2, Option 1), because NMFS cannot release confidential gear location data, and the location of gear left or lost on the grounds cannot be verified. Determining whether vessels in the pot longline fishery move their gear every four or seven days (Element 2, Option 2) requires mandatory logbooks on all vessels participating in the fishery. NMFS also outlines regulations to require a valid pot tag registration on board a vessel fishing pot longline gear, removal of pot longline gear from the fishing grounds at the end of the sablefish IFQ fishing season, and prohibit deployment of pot longline gear prior to the opening of the season. NMFS did not develop regulations to require both ends of a sablefish pot longline set be marked with flagpoles and transponders that work with AIS or an equivalent system (Element 3) because NMFS is not able support the infrastructure to implement or actively maintain, monitor and enforce AIS. NMFS recommends marking buoys used to locate pot longline gear sets with the initials “PL” to distinguish this gear from HAL gear. If Federal regulations and IPHC annual management measure regulations are recommended to identify pot longline gear as legal gear for halibut (Element 4), NMFS will coordinate the timing of implementation of complementary sets of regulations with IPHC. NMFS recommends that Federal regulations include provisions to ensure that halibut are at or above the commercial size limit set by IPHC, and halibut less than legal-size in length are released carefully to the sea.

Comparison of Alternatives for Decision making

Table ES-4 Summary of alternatives and major impacts

	Alternative 1	Alternative 2 (December 2014)	Preferred Alternative 2 (April 2015)
Differences in Alternatives			
FMP amendment	No	Yes	Yes
Reg. amendment	No	Yes	Yes
Gear	No pot longline	Pot longline (select SEO, WY, WGOA or CGOA, or all GOA regulatory areas)	Pot longline (all regulatory areas)
Element 1. Pot limits	None	Maximum number of pots set between 60 and 400	SEO and WY: 120 pot limit per area WGOA and CGOA: 300 pot limit per area
Element 1: Option Pot Tags	None	Identification tags required for each pot	Identification tags required for each pot
Element 2. Gear retrieval	None	Require location of pot longline gear set, left, or lost to be submitted to an electronic database	WY and CGOA: Gear can be left unmoved for no more than 5 days WGOA: Gear can be left unmoved for no more than 7 days SEO: Gear must be removed from grounds when making a delivery
		Require movement of pot longline gear every [4 or 7] days, at minimum	Pot longline gear cannot be set before fishing season begins and must be removed prior to end of fishing season
Element 3. Gear specifications	None	Require marking of both pot longline set ends with buoy and/or flagpole, and AIS transponder	Require marking of both pot longline set ends with a 4-buoy cluster (1 hard ball), (mark 1 buoy with "PL" and mark vessel ADF&G number or Federal permit number on all buoys), flagpole, and radar reflector
Element 4. Halibut Retention	None	Require retention of legal-size halibut if sufficient IFQ is held onboard	
Additional Requirements	None		Vessels using pot longline gear must use both logbooks and VMS
			Declare the number of pots fished (set), lost and/or still fishing on the PNOL
Environmental Impacts			
Whales	No changes	Reduces whale interaction with fishing gear; Marking both ends of longline sets could double the chance of whale entanglements with anchor lines	
Seabirds	No changes	Reduces seabird interaction with fishing gear	
Sablefish	No changes	Minimizes unaccounted mortality	
Halibut	No changes	Reduced incidental catch; Element 4 would minimize discard mortality	
Other Fish Species	No changes	Reduced incidental catch of most species; minimizes discard mortality	
Economic Impacts			
Fishing effort	Depredation increases fishing time and decreases CPUE	Reduces costs of gear/bait loss and variable costs necessary to harvest sablefish IFQ; Additional efficiencies associated with retaining halibut incidental harvest against IFQ	
Distributional impacts	No changes	Vessels that do not use pot gear might experience greater depredation, gear conflict, grounds preemption; High initial adoption costs to acquire pots and reconfigure vessel; Costs of gear marking might marginally impact operations with less capital to a greater extent; Under a high pot limit, pot vessels with less capacity would be able to occupy less grounds, and would experience higher variable costs; If pot longline gear becomes the predominant method of harvest, IFQ holders who are unable to convert gear might choose to fish their quota from a different vessel, thus reducing fleet size	

Interagency Coordination			
Requires complementary action by the Alaska Board of Fisheries	No	Elements 1 – 3 could require complementary state action for consistency	Elements 1 – 3 could require complementary state action for consistency
Requires complementary action by the International Pacific Halibut Commission	No	Element 4: IPHC adopts regulations to identify pot longline as legal gear in the GOA	Element 4: IPHC adopts regulations to identify pot longline as legal gear in the GOA

1 Introduction

This document analyzes proposed management measures that would apply exclusively to the Individual Fishing Quota (IFQ) fishery in the Gulf of Alaska (GOA) for sablefish (*Anoplopoma fimbria*), also known as black cod. A proposed FMP and regulatory amendment would allow the use of pot longline gear for the sablefish IFQ fishery in the GOA. The considered measures include: (1) redefine legal gear to include pot longline gear, potentially subject to a pot limit enforced by pot-identification tags, (2) require that pot longline gear be moved or tended within a certain amount of time after being set, or removed from the fishing grounds when making a sablefish delivery, (3) require marking of pot longline gear, and (4) require retention of Pacific halibut (*Hippoglossus stenolepis*) if sufficient IFQ is held by fishermen to cover both the sablefish and halibut IFQ caught using pot longline gear.

This document is an Environmental Assessment/Regulatory Impact Review Analysis (EA/RIR). An EA/RIR provides assessments of the environmental impacts of an action and its reasonable alternatives (the EA) and the distribution of economic benefits and costs of the action alternatives (the RIR). This EA/RIR addresses the statutory requirements of the Magnuson-Stevens Fishery Conservation and Management Act, the National Environmental Policy Act, and the Presidential Executive Order 12866. An EA/RIR is a standard document produced by the North Pacific Fishery Management Council (Council) and the National Marine Fisheries Service (NMFS) Alaska Region to provide the analytical background for decision-making.

1.1 Purpose and Need

The Council adopted the following purpose and need statement in December 2014, and affirmed it when taking final action in April 2015.

> *Interactions with whales throughout the Gulf of Alaska affect the ability of sablefish quota share holders to harvest their sablefish IFQs 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 Gulf of Alaska. 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.*

The action is proposed to minimize fishery interaction with marine mammals and seabirds and adverse impacts on the sablefish IFQ fleet from depredation by sperm whales (*Physeter macrocephalus*) and killer whale (*Orcinus orca*). Depredation has negative consequences for the sablefish IFQ fleet through reduced catch rates and increased operating costs. Depredation also has negative consequences for the whales through increased risk of vessel strike, gear entanglement, fisherman aggression, and altered foraging strategies. An additional management concern stems from the impact that whale depredation may have on the accuracy of sablefish stock abundance indices.

1.2 History of this Action

Mr. Michael Douville of Craig, Alaska submitted a proposal on March 31, 2006 to allow the use of pots in the sablefish fishery in southeast Alaska. Mr. Douville identified that his proposal would address several Council concerns: (a) seabird takes and (b) interaction with whales. He identified that there would be no negative impact on anyone under his proposal. As an allowable gear type, fishermen could choose

to use pots, but would not be required to invest in new gear, if they are happy with hook-and-line (HAL, or "longline") longline gear. Mr. Douville identified potential positive outcomes of a decline in seabird takes, including albatross, and a decrease in fishing gear/whale interactions. In addition, bycatch of rockfish would also be reduced, and fishermen would require less bait and fishing effort to catch the same amount of sablefish.

The Council called for IFQ proposals in 2009. The IFQ Implementation Committee forwarded this proposal in November 2009 for Council consideration. The IFQ Implementation Committee noted that while seabird interactions are no longer a serious concern, there have been extreme sperm whale and killer whale interactions with the sablefish fleet in the GOA. These interactions often result in depredation, the technical term for whales stealing or damaging fish caught on fishing gear. Allowing pot gear in this fishery could mitigate the adverse impacts of whales on the sablefish IFQ longline fishery (and potentially the Pacific halibut IFQ longline fishery), but there are a number of implications that must be considered, such as gear conflicts, gear loss, and changes in crew jobs. The IFQ Implementation Committee adopted the following motion.

> *"Recommend that the proposal has merit for Council review and analysis. If the Council adopts this proposal for analysis the team recommended that the proposal be expanded to the GOA, and the analysis should address the following issues: 1) restrictions to gear usage (a) single v longline pots, b) pots retained on grounds for long soaks v retrieved during deliveries, c) pot storage, d) gear configuration requirements; e) gear conflicts, f) use the 200 fathom depth contour to mark open areas, g) pot soak timeslot; 2) area management (SE v GOA); 3) exacerbation of halibut mortality; 4) dynamic (social/economic) effects, including a) small vessels could not safely use pots, b) crew employment, c) QS prices; d) ongoing acoustic research for avoiding whale depredation." Passed 10:1.*

An interagency staff group reviewed the proposal to allow retention of sablefish in pots in the GOA Southeast Outside management area. The staff recommendations follow.

> *"This would require a regulatory amendment to Section 679 (plan amendment too) to allow a new gear type for sablefish. USCG staff recommends defining areas by lat/long where the new gear type would be allowed, and not by the 200 fathom contour. Enforcement of Proposal 2 is within the scope of the Joint Enforcement Agreement, it's not currently addressed in the Annual Operations Plan. If this proposal is implemented in regulations, NOAA would likely discuss the issue with Wildlife Troopers and possibly include it in the annual operations plan, as well as rely heavily upon the USCG for enforcement. If the Council recommends that this proposal be analyzed, staff recommends expanding the proposed action to require distinctive marking of buoys by gear type for all groundfish fisheries. This proposal would affect the EEZ only, and would be outside the scope of the joint enforcement agreement with the State of Alaska."*

The Advisory Panel concurred with the IFQ Implementation Committee recommendation in February 2010. The AP unanimously recommended that the Council initiate a discussion paper on the use of pots in the GOA and/or Southeast Alaska (SE) sablefish fishery and establish a gear committee to identify possible gear conflicts and grounds preemption issues. The motion passed 17-0.

In February 2010 the Council adopted the AP motion and identified an extensive list of issues that the paper should discuss.

In April 2012, the Council noticed the public of its intent to form a gear committee to advise the Council on gear issues, but did not called for nominations or appoint the committee. The Council stated that the discussion paper considering whether to allow IFQ halibut to be retained in pots in Area 4A may be

informative in regard to allowing the use of pots in the GOA. A discussion paper on Area 4A halibut retention was presented in December 2012[1]. A more recent discussion paper on that issue was presented in April 2015, concurrent with final action on this set of alternatives. At that meeting, the Council chose to take no further action on halibut retention in pot gear in Area 4A at the present time (see further discussion in Section 3.2.1).

In December 2014, the Council received a draft EA/RIR/IRFA. The purpose and need statement was revised as it is reflected above. Elements for the action alternative (Alternative 2) were also revised. Among the additions to the action alternative was the option to allow pot longline gear in only select GOA regulatory areas.

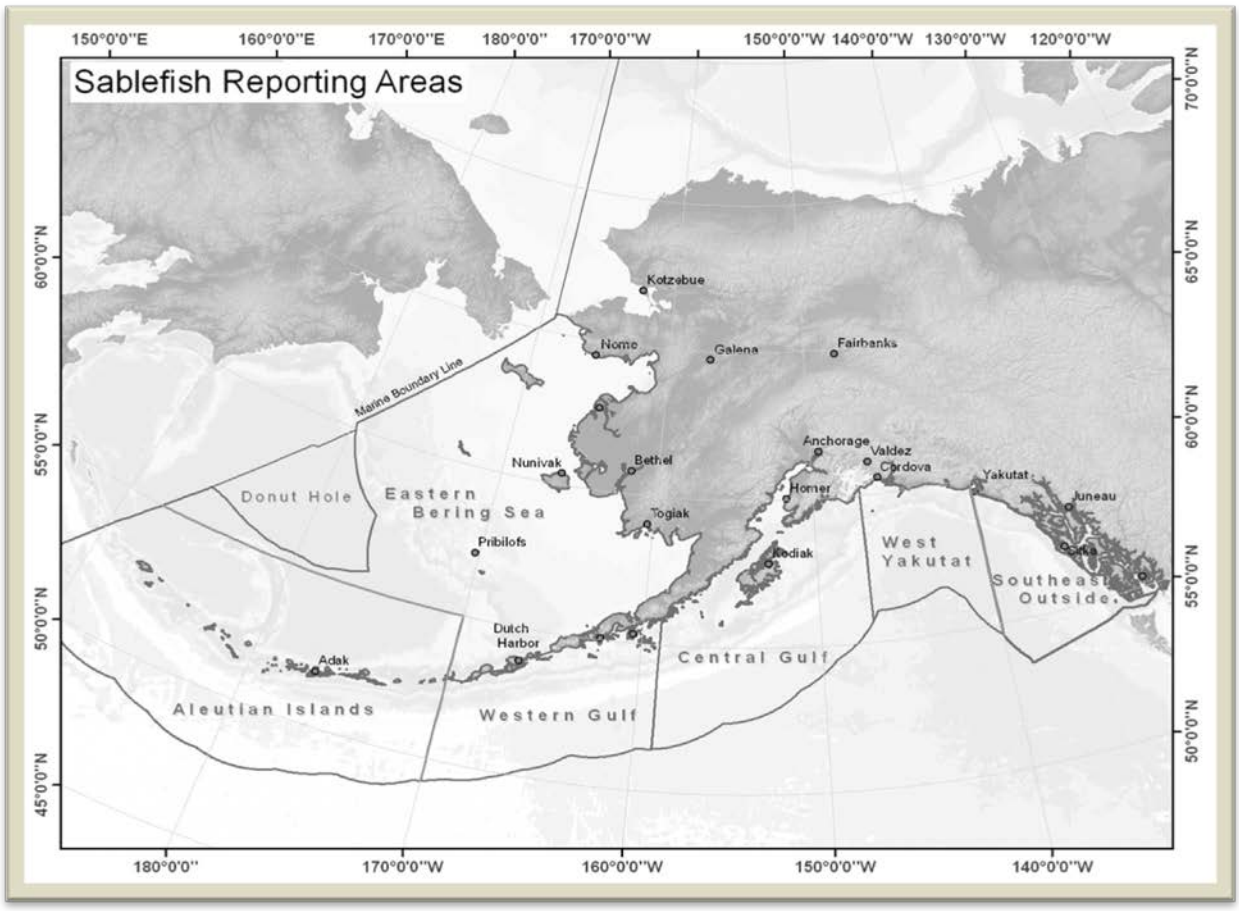
The Council took final action in April 2015, adopting the preferred alternative that is described in Section 2.2. The preferred alternative includes four elements, and additional guiding language. Elements that were considered, but are not reflected in the Council's current set of alternatives, are described in Section 2.4.

1.3 Description of Action Area

Figure 1 shows the action area for this proposed action. The Gulf of Alaska (GOA) includes the Western GOA, Central GOA, and Eastern GGOA (West Yakutat (WY) and Southeast Outside districts (SEO)) management areas).

[1] http://www.npfmc.org/wp-content/PDFdocuments/halibut/4AhalibutPots_dp_1212.pdf

Figure 1 Sablefish Management Areas and Districts in the GOA



2 Description of Alternatives

NEPA requires that an EA analyze a reasonable range of alternatives consistent with the purpose and need for the proposed action. The alternatives in this chapter were designed to accomplish the stated purpose and need for the action (Section 1.1). The proposed action alternative and its options were designed to amend the definition of legal gear in the Federal regulations and the GOA Groundfish FMP that govern the sablefish IFQ fishery in the GOA.

The Council adopted the following alternatives for analysis in December 2014. The preferred alternative was defined at final action in April 2015.

2.1 Alternative 1: No Action

Under Alternative 1, the sablefish IFQ fishery in the GOA would remain limited to hook-and-line (HAL) gear. The GOA Groundfish FMP and Federal regulations currently define legal gear for the sablefish IFQ fishery in the GOA as HAL gear.

2.1.1 History of FMP Gear Restrictions for the GOA Sablefish IFQ Fishery

Two early GOA Groundfish FMP amendments, 12 (withdrawn) and 14, addressed a prohibition on the use of pot (pot-and-line (single pot) or pot longline) gear for sablefish in the GOA. Amendment 12 was adopted by the Council in July 1982 and then withdrawn after adoption of Amendment 14. Amendment 12 was intended to address two potential problems in the Southeast sablefish fishery and proposed to prohibit the use of pot longline gear for sablefish between 140°W longitude and Cape Addington. The objectives of the proposed Amendment 12 were to:

1) Conserve and restore the depressed sablefish fishery; and
2) Prevent fishing grounds preemption and wastage of the existing sablefish resource.

Amendment 14 prohibited the use of all pot gear in the GOA sablefish fishery. As described in the Amendment 14 EA/RIR/IRFA, the amendment was designed to address excess capacity and grounds preemption problems in existence at the time. The Council decided that gear and area restrictions and apportionments to gear types would be most effective at addressing those problems in the fishery. The gear prohibition was adopted by the Council in May 1985. NMFS published the proposed rule on July 26, 1985 (50 FR 30481), and a final rule on October 24, 1985, effective November 18, 1985 (50 FR 43193). The purpose and need for the action is summarized below from the proposed rule.

The sablefish fishery traditionally had been a foreign longline fishery off Alaska, but in the EGOA in the early 1980s, domestic longliners had increased their harvests rapidly as markets developed, largely due to an agreement by the foreign longline fleets to abstain from fishing in the GOA after October 7, 1984. This agreement was intended to allow U.S. fishermen the opportunity to prove the claim that they could take the entire GOA groundfish catch limits. New market opportunities fueled the domestic fishery, and U.S. fishermen took the bulk of the catch limits in both the EGOA and CGOA management areas, and substantially increased their catches in the WGOA. The bulk of this catch was taken with hook-and-line longline gear, although two new gear types, pots and sunken gillnets, entered the fishery in 1984. In addition, trawling by foreign joint ventures in the CGOA and WGOA also took sablefish. All these gears created an overcapacity problem in the domestic sablefish fishery, as well as gear conflicts between longline and pot fishermen. Therefore, the concerns expressed to the Council at the time were two-fold: (1) fishermen experimenting with new gear when the foreign sablefish fishery was Americanized caused gear conflicts; and (2) new gear diminished the harvest share of traditional gear types and led to adverse effects on traditional gear fishermen.

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 vessels dominated the fishery. Directed fishing for sablefish using trawls and gillnets also was 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.

Historically the Southeast Alaska sablefish fishery began in spring when weather and fishing conditions improved and the fish had recovered from spawning. In January 1985, however, three large vessels fished for sablefish using pot gear. Pot gear was set within a narrow depth range (250 – 500 fathoms) as is hook-and-line gear. Fishing was good and the catch by pot gear totaled about 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. When hook-and-line gear, which is relatively light weight, becomes entangled with the heavier pot gear, the hook-and-line gear breaks and is often lost. Gear conflicts were likely between these two gear types since fishing was concentrated along the narrow shelf edge. Hook-and-line 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.

In response to this information, the Council requested an emergency rule in February 1985 to prohibit the use of pots in the directed sablefish fishery in the EGOA management area as an interim solution; the Secretary of Commerce (Secretary) implemented the emergency rule on April 1, 1985, to be effective until June 25, 1985.

After considering extensive public testimony and advice from its Advisory Panel (AP) and Scientific and Statistical Committee (SSC), the Council adopted Amendment 14, which contained a number of measures to manage the sablefish fishery in the GOA. It made hook-and-line gear the only legal gear type for the directed sablefish fishery in the EGOA management area starting in 1986. It also made hook-and-line and trawl gear the only legal gear types for the directed sablefish fishery in the CGOA management area starting in 1987, and in the WGOA management area in 1989.

Amendment 14 also allocated the sablefish OYs among the gear types. In the EGOA management area, 95 percent of the OY is allocated to hook-and-line gear; the remaining 5 percent is allocated to trawl gear as a bycatch to support target fisheries for other species. In the CGOA management area, 55 percent, 25 percent, and 20 percent of the OY was allocated to HAL, pot, and trawl gear, respectively, in 1986. When pot gear was phased out of the CGOA management area in 1987, the surplus portion of the sablefish OY for that area was allocated to hook-and-line gear; the share allocated to trawl gear remained at 20 percent. In the WGOA regulatory area, 55 percent, 25 percent, and 20 percent of the OY was allocated to HAL, pot, and trawl gear, respectively, in 1986, 1987, and 1988. When pot gear was phased out of the WGOA management area in 1989, the surplus portion of the OY was allocated to hook-and-line gear; the share allocated to trawl gear remained at 20 percent.

The schedule for phasing out pot gear and allocating the sablefish OYs among the gear types was determined by the Council in recognition of several important factors. These included historical economic dependence of hook-and-line vessels on the sablefish fishery, their development of the market in a fishery that was largely foreign-dominated until 1983, and the problems with grounds preemption and potential for gear conflicts between hook-and-line and pot gear. The Council's choice was the result of extensive debate and consistent with a recommendation from its AP. The Council's decision to ban pot gear in the EGOA management area starting in 1986 reflects the traditional dependence by Southeast Alaska communities on the sablefish hook-and-line fishing industry. The one-year and three-year phasing out of

pot gear in the CGOA and WGOA management areas reflected the concerns voiced by the public and by certain AP members that some pot vessel operators have invested substantial funds in converting their vessels to pot gear, and that sufficient time was needed to convert to the use of other gear for sablefish fishing or for entry into some other fishery. The action also provided sufficient bycatch amounts of sablefish to trawl vessels conducting fisheries on other target species.

2.2 Alternative 2: Council's Preferred Alternative

The Council recommended the following Elements and Options for the action alternative in December 2014. The Council's preferred alternative is shown in **bold** type. Strikethrough indicates language in the elements of the preferred alternative that was deleted at final action in April 2015.

Alternative 2. Allow the use of pot longline gear in the GOA Sablefish IFQ fishery ~~(the Council can select any or all GOA areas: WGOA, CGOA, WY, or SEO).~~

Element 1. ~~Limit of 60 to 400 pots (different pot limits can be selected for each area).~~

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

~~Option 1. Require the location of pots set, left, or lost on the grounds to be submitted to an electronic database when in the water.~~

Option 2. ~~Gear cannot be left more than (Options) four or seven days without being moved.~~

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 ~~buoys and/or flagpoles and transponders that work with AIS or an equivalent system~~.

Element 4. Retention of incidentally caught halibut

Require ~~Allow~~ 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 longline pot fishery under the requirements of regulations implementing this program.

Additionally, all vessels using longline pot 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 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.

A review on the effects of allowing GOA Sablefish longline pot gear will be conducted 3 years after implementation and that NMFS include pot gear effort in their management report to the Council.

In December 2014, the Council provided an explanatory note regarding Element 2, Option 2. The requirement to "move" gear could also be satisfied by tending the gear. In other words, a fisherman would only need to haul and re-set the gear within the defined time limitation. Defining "movement" of gear in terms of relocation would be difficult to describe in regulation and to enforce; tending gear accomplishes the objective of having fishermen on the grounds near their pot longline gear within a specified period of time. This direction was part of the Council's consideration of the preferred alternative at final action.

2.3 Comparison of Alternatives

Alternative 1 is the no action alternative, which would maintain the status quo management of the GOA sablefish IFQ fishery. If the Council takes no action, use of pot longline gear would continue to be prohibited in the GOA sablefish IFQ fishery.

Under the Council's preferred alternative (Alternative 2), pot longline gear would be allowed in the GOA sablefish IFQ fishery. The preferred alternative includes options that would restrict the use of pot longline gear in this fishery. These restrictions include the following: (1) limit the total number of pots allowed to be fished from a single vessel in a given regulatory area; (2) require that pot longline gear be moved or tended after no more than a maximum number of days after being set, or, in certain areas, require that pot gear be removed from the fishing grounds when making a delivery; and (3) require that pot longline sets be marked at both ends with buoy clusters, flagpoles, and radar reflectors. The preferred alternative seeks to minimize regulatory discards of halibut by requiring the retention of any halibut incidentally caught in GOA sablefish pots; regulations defining this requirement will only be implemented if the IPHC takes complementary action to make pot longline gear legal for halibut fishing in the GOA. Incidentally caught halibut may only be retained if they are of legal-size and if an IFQ holder on the vessel possesses sufficient halibut IFQ to cover the catch.

Table 1 summarizes the major environmental and economic impacts of the alternatives in this analysis. The preferred alternative would require amendments to both the GOA Groundfish FMP and Federal regulations. IPHC would also need to consider adopting regulations to allow retention of halibut in pot longline gear if the Council takes action on Alternative 2, Element 4. Proposed revisions for regulatory language are listed in the Management and Enforcement Considerations subsections under each Element (see Section 4.9).

Table 1 Summary of alternatives and major impacts

	Alternative 1	Alternative 2 (December 2014)	Preferred Alternative (April 2015)
Differences in Alternatives			
FMP amendment	No	Yes	Yes
Reg. amendment	No	Yes	Yes
Gear	No pot longline	Pot longline (select SEO, WY, WGOA or CGOA, or all GOA regulatory areas)	Pot longline (all regulatory areas)
Element 1. Pot limits	None	Maximum number of pots set between 60 and 400	SEO and WY: 120 pot limit per area WGOA and CGOA: 300 pot limit per area
Element 1: Option Pot Tags	None	Identification tags required for each pot	Identification tags required for each pot
Element 2. Gear retrieval	None	Require location of pot longline gear set, left, or lost to be submitted to an electronic database	WY and CGOA: Gear can be left unmoved for no more than 5 days WGOA: Gear can be left unmoved for no more than 7 days SEO: Gear must be removed from grounds when making a delivery
		Require movement of pot longline gear every [4 or 7] days, at minimum	Pot longline gear cannot be set before fishing season begins and must be removed prior to end of fishing season
Element 3. Gear specifications	None	Require marking of both pot longline set ends with buoy and/or flagpole, and AIS transponder	Require marking of both pot longline set ends with a 4-buoy cluster (1 hard ball), (mark 1 buoy with "PL" and mark vessel ADF&G number or Federal permit number on all buoys), flagpole, and radar reflector
Element 4. Halibut Retention	None	Require retention of legal-size halibut if sufficient IFQ is held onboard	
Additional Requirements	None		Vessels using pot longline gear must use both logbooks and VMS
			Declare the number of pots fished (set), lost and/or still fishing on the PNOL
Environmental Impacts			
Whales	No changes	Reduces whale interaction with fishing gear; Marking both ends of longline sets could double the chance of whale entanglements with anchor lines	
Seabirds	No changes	Reduces seabird interaction with fishing gear	
Sablefish	No changes	Minimizes unaccounted mortality	
Halibut	No changes	Reduced incidental catch; Element 4 would minimize discard mortality	
Other Fish Species	No changes	Reduced incidental catch of most species; minimizes discard mortality	
Economic Impacts			
Fishing effort	Depredation increases fishing time and decreases CPUE	Reduces costs of gear/bait loss and variable costs necessary to harvest sablefish IFQ; Additional efficiencies associated with retaining halibut incidental harvest against IFQ	
Distributional impacts	No changes	Vessels that do not use pot gear might experience greater depredation, gear conflict, grounds preemption; High initial adoption costs to acquire pots and reconfigure vessel; Costs of gear marking might marginally impact operations with less capital to a greater extent; Under a high pot limit, pot vessels with less capacity would be able to occupy less grounds, and would experience higher variable costs; If pot longline gear becomes the predominant method of harvest, IFQ holders who are unable to convert gear might choose to fish their quota from a different vessel, thus reducing fleet size	

Interagency Coordination			
Requires complementary action by the Alaska Board of Fisheries	No	Elements 1 – 3 could require complementary state action for consistency	Elements 1 – 3 could require complementary state action for consistency
Requires complementary action by the International Pacific Halibut Commission	No	Element 4: IPHC adopts regulations to identify pot longline as legal gear in the GOA	Element 4: IPHC adopts regulations to identify pot longline as legal gear in the GOA

2.4 Alternatives Considered but Not Analyzed Further

As part of its scoping of this issue with the public, and through its advisory committees, the Council considered and rejected other management approaches. The Council opted not to pursue the use of single pot gear in the GOA sablefish IFQ fishery. Despite both single and longline pots defined as legal gear in the sablefish IFQ fisheries in the BSAI, several advisory committees recommended against the use of single pots as legal gear in the sablefish IFQ fishery in the GOA. The IFQ Implementation Committee, Sablefish Gear Committee, and Advisory Panel recommended that the proposed action be considered for pot longlines only (continue prohibition on single pots). The committees noted the benefits of using pot longlines versus single pots to maximize fishing efficiency and ex-vessel value of the fishery. Single pots are heavy and their deployment results in lost gear and resultant ghost fishing. Pot longline strings, reportedly worth $10,000 to $12,000 each, can be parted and rejoined if they become wrapped up with other gear. Use of single pots creates more gear conflict from increased number of anchor lines and buoys, and could result in increased whale interactions with the gear, some of which are protected under the Endangered Species Act and Marine Mammal Protection Act. Typically, pots deployed in a longline format are lighter. The committees noted that handling of lighter pot longline gear enhances crew safety, particularly on smaller vessels. The Council accepted these recommendations.

The Council considered, but rejected, allowing the use of pot longline gear only in the Southeast Outside (SEO) management area, as originally proposed. While the SEO currently does not have gear conflicts (due to prohibition on the use of trawl and pot gear), it has several vessel size and bottom topography issues that would influence the potential usage of pot longline gear. These issues include a fleet with smaller boats that may not be able to carry and deploy pot longline gear, different business plans and fishery techniques (smaller, owner/operator fleet), habitat composed of rocky bottoms and corals, and remaining HAL operations that may experience more depredation if part of the fleet switches to pot longline gear.

The Council considered but rejected the use of the 200 fathom depth contour to mark open areas for the pot longline sablefish IFQ fishery. The rationale for using the 200 fathom contour to regulate fishing gear in the sablefish IFQ fishery was not clearly articulated. An interagency staff group, including monitoring and enforcement agencies, recommended against using depth contours for regulating the fishery, instead recommending the use of latitude and longitude. The Sablefish Gear Committee unanimously recommended not considering the 200 fathom line as part of this action as no benefit could be identified to this approach. Enforcement agencies also recommended against this approach; among other reasons, latitude and longitude are easier to monitor from the air.

The Council received comments from the Sablefish Gear Committee and public testimony at Council meetings proposing the consideration of establishing different areas for pot longline gear and HAL gear. Those areas would be defined by latitude and longitude. The Council did not include gear subareas as an alternative for several reasons. Subareas could force fishermen using the same gear type into closer

proximity when fishing, thus, increasing the chances of gear conflict within a gear group. The task of deciding which area should be allocated to which gear type could be contentious, and would likely be at too fine a scale to analyze with the data available to the Council. Finally, area restrictions would require further analysis and Council action to redefine if the sablefish stock were to shift in such a significant way as to create inequity between gear types over the medium- to long-term. The Council also received public testimony proposing different times of year during which either pot longline gear or HAL gear would be permitted. The Council did not pursue this direction, for reasons similar to those stated above. Determining which gear group is permitted to fish at a certain time could be contentious, and could be advantageous to one group at the cost of another in unforeseeable ways. The diversity of individual fishing plans within the sablefish fleet makes the task of dividing the fishing season in an agreeable manner a challenging one.

Previous iterations of this analysis included background information on gear storage areas in other Alaska fisheries. Some public commenters had mentioned designated storage areas as a tool to help smaller boats comply with gear retrieval requirements without having to transit pot longline gear back to port during every landing. Options to allow gear storage were viewed as unnecessary when the Council decided not to require the removal of pots from the fishing grounds during every delivery. For reference, this document still contains information on the definition of pot storage areas for state-waters Pacific cod fisheries (Section 4.8.3).

At its December 2014 meeting, the Council made several refinements to the action alternative (Alternative 2) after an initial review of the EA/RIR/IRFA. The alternative had previously been structured such that the recommendation to allow pot longline gear would necessarily apply to all GOA areas. The Council determined that it would like to consider the effects of adding a new legal gear type in each area, individually, considering the variability in fleet and fishery dynamics across the GOA. The Council had previously considered exemptions from any gear retrieval requirements based on vessel size, as evaluated by length overall (LOA). Members of the public and enforcement agencies noted that length is not necessarily correlated with pot carrying capacity and vessel stability. The Council eliminated an option that would have required vessels of a certain size to remove all pot longline gear from the fishing grounds when making a landing. Instead, the Council moved forward with analysis of a gear retrieval element that would require the location of pots to be tracked in a database that is available to other fleet members, as well as an option that would require gear to be tended or moved after a certain amount of time. The Council also eliminated a gear specification that would have required the use of neutrally buoyant groundline. It was determined that this is currently a common practice for pot longline fishermen, and that individuals already have private incentives to use a groundline is less likely to hang up on bottom structure and that makes parted gear easier to retrieve. The Council chose to moderate itself in regulating gear features too closely, and noted that defining neutral buoyancy for enforcement could be cumbersome. Staff also analyzed a suggested option to set a maximum retainable amount (MRA) for halibut caught in sablefish pots. The Council recognized that data on the incidence of halibut in sablefish pots does not exist for the GOA, so any MRA would be speculative and would likely have to be established through a trailing action. The Council also noted that the amount of halibut caught in pot longline gear is not expected to be large, given the different depths at which the two species are typically found. The MRA portion of the halibut retention element (Element 4) was not retained for further analysis. Finally, staff had included a short discussion of allowing capacity-limited vessels to "share" gear, perhaps reducing the incentive for vessels to transport more gear than is safe. Gear sharing might also reduce the amount of fishing grounds preempted by each vessel. Gear cooperatives in the rationalized Bering Sea crab fisheries allow co-op members to tend another's gear. However, the initial analysis noted enforcement challenges, and concerns that shared gear could preempt one part of the fishing grounds throughout the entire fishing year. As a result, the Council did not include gear sharing as an option in the final set of alternatives.

The Council selected a preferred alternative in April 2015. The selected elements of Alternative 2 are reflected in Section 2.2. The rationale for choosing those elements and options, and for the options not selected, is described in more detail in Section 4.10. Two previously analyzed options that were not selected relate to gear retrieval (Element 2) and gear specifications (Element 3). The Council chose not to pursue requirements for fishermen to submit the location where their pot longline gear is fishing to an electronic database, which had the purpose of minimizing gear conflict through information sharing. The Council cited NMFS's legal limitations in sharing that confidential information with other members of the fleet, as well as the high administrative cost of managing a real-time information network. The Council also removed language in Element 3 that would have required pot longline gear buoys to be marked with transponders that utilize Automatic Identification System (AIS) technology. This technology is further described in Appendix 2. The Council generally moderated itself in closely regulating technological applications in a quickly evolving field. The Council also noted that the use of AIS for gear-marking is not currently permitted under international maritime law and U.S. Coast Guard (USCG) policy.

3 Environmental Assessment

There are four required components for an environmental assessment. The need for the proposal is described in Section 1, and the alternatives are described in Section 2. This section addresses the probable environmental impacts of the proposed action and alternatives. Section 4 addresses the probable social and economic impacts of the proposed alternatives. Section 5 considers how the proposed action might differentially impact small entities. Section 6 lists the ways in which this analysis addresses the requirements of relevant Federal regulations. A list of agencies and persons consulted is included in Section 7.

The best and most recently available information necessary to understand the affected environment for each resource component is summarized in the relevant subsections of the EA chapter. For each resource component, the analysis identifies the potential impacts of each alternative, and uses criteria to evaluate the significance of these impacts. If significant impacts are likely to occur, preparation of an Environmental Impact Statement (EIS) would be required. Although an EIS would evaluate economic and socioeconomic impacts that are interrelated with natural and physical environmental effects, economic and social impacts by themselves are not sufficient to require the preparation of an EIS (see 40 CFR 1508.14).

The National Environmental Policy Act (NEPA) also requires an analysis of the potential cumulative effects of a proposed action and its alternatives. An environmental assessment or environmental impact statement must consider cumulative effects when determining whether an action significantly affects environmental quality. The Council on Environmental Quality (CEQ) regulations for implementing NEPA defines cumulative effects as:

> *"the impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7*).

The discussion of past and present cumulative effects is addressed with the analysis of direct and indirect impacts for each resource component below. There are no known cumulative impacts of reasonably foreseeable future actions on any stock or component of the GOA.

Documents incorporated by reference in this analysis

This EA relies heavily on the information and evaluation contained in previous environmental analyses, and these documents are incorporated by reference. The documents listed below contain information about the fishery management areas[2], fisheries, marine resources, ecosystem, social, and economic elements of the groundfish fisheries. They also include comprehensive analysis of the effects of the fisheries on the human environment, and are referenced in the analysis of impacts throughout this chapter.

Alaska Groundfish Harvest Specifications Final Environmental Impact Statement (NMFS 2007).

This EIS provides decision makers and the public an evaluation of the environmental, social, and economic effects of alternative harvest strategies for the federally managed groundfish fisheries in the GOA and the BSAI management areas and is referenced here for an understanding of the groundfish

[2] Or, for halibut, "regulatory area".

fishery.[3] The EIS examines alternative harvest strategies that comply with Federal regulations, the Fishery Management Plan (FMP) for Groundfish of the GOA, the Fishery Management Plan (FMP) for Groundfish of the BSAI Management Area, and the Magnuson-Stevens Fishery Conservation and Management Act (MSA). These strategies are applied using the best available scientific information to derive the total allowable catch (TAC) estimates for the groundfish fisheries. The EIS evaluates the effects of different alternatives on target species, non-specified species, forage species, prohibited species, marine mammals, seabirds, essential fish habitat, ecosystem relationships, and economic aspects of the groundfish fisheries.[4]

Stock Assessment and Fishery Evaluation (SAFE) Report for the Groundfish Resources of the GOA (Hanselman et al. 2014).

Annual SAFE reports review recent research and provide estimates of the biomass of each species and other biological parameters. The SAFE report includes the acceptable biological catch (ABC) specifications used by NMFS in the annual harvest specifications. The SAFE report also summarizes available information on the ecosystems and the economic condition of the groundfish fisheries off Alaska. This document is available from: http://www.afsc.noaa.gov/refm/stocks/assessments.htm.

Final Programmatic Supplemental Environmental Impact Statement (PSEIS) on the Alaska Groundfish Fisheries (NMFS 2004).

The PSEIS evaluates the Alaska groundfish fisheries management program as a whole, and includes analysis of alternative management strategies for the GOA and BSAI groundfish fisheries. The EIS is a comprehensive evaluation of the status of the environmental components and the effects of these components on target species, non-specified species, forage species, prohibited species, marine mammals, seabirds, essential fish habitat, ecosystem relationships, and economic aspects of the groundfish fisheries. This document is available from: http://alaskafisheries.noaa.gov/sustainablefisheries/seis/intro.htm.

Analytical method

Table 2 shows the components of the human environment and whether the proposed action or its alternative may have an impact on the component and require further analysis. Extensive environmental analysis on all environmental components is not needed in this document because the proposed action is not anticipated to have environmental impacts on any other environmental components.

The proposed action to allow a new gear type to harvest sablefish IFQ (and possibly incidental amounts of halibut IFQ) in the GOA is limited in scope and will not likely affect all environmental components of the GOA. Six potentially affected components are shown in Table 2: sablefish, halibut, other groundfish, marine mammals (specifically sperm whales and killer whales), seabirds, and socioeconomics. The effects of the alternatives on the resource components would be caused by: (1) increased efficiency in harvesting sablefish and halibut IFQ: (2) decreased unaccounted mortality of sablefish (and potentially halibut) that are lost to whale depredation during IFQ fishing operations; (3) potential decrease in whale and seabird interactions (i.e., entanglements) with pot longline gear in the GOA, as compared with the status quo of HAL longline gear); and (4) lower incidence of other groundfish species caught in pot longline gear as compared to HAL longline gear. No increase in sablefish or halibut catches would occur, as those fisheries are managed under the IFQ Program and harvests levels are effectively capped. The socioeconomic environment may be affected by increased efficiency in harvesting sablefish IFQ (e.g., catch per unit effort, reduced fuel/bait costs, reduced opportunity costs), but could also be affected by the redistribution of effort among members of the existing harvest fleet (these issues are further discussed in

[3] The alternatives considered in this EA will not cause any of the potentially significant impacts addressed in the Alaska Groundfish Harvest Specifications Final EIS to recur.

[4] http://alaskafisheries.noaa.gov/analyses/specs/eis/default.htm

the RIR, Section 4). The following subsections discuss the affected environmental resource in relation to each of the considered management alternatives, and the preferred alternative.

No effects are expected on the physical environment, habitat, resource component species (other than halibut), and ecosystem components of the environment. No effect is presumed for these components because current or proposed fishing regulations, harvest limits, and habitat protections as described in previous NEPA documents (above) would not be changed by any of the alternatives, including the preferred alternative. No effects are presumed for bottom habitat because Essential Fish Habitat (EFH) is not described for coral in the GOA, nor has coral habitat distribution been mapped. The Long-term Effect Index (LEI) found 0-1 percent (the lowest score) fishing effects on coral in the EGOA (NMFS 2005). The LEI increases as fishing moves west past Yakutat and as the gears that could interact with coral (see Figure B2-6b in NMFS 2005) occupy the same depth. The likely effects on coral from HAL longline gear and pot longline gear are reported to be similar, although no side by side comparisons have been done. Most sablefish and halibut IFQ fishermen are knowledgeable of the location of coral areas and strive to minimize gear damage/loss and increase their catch. None of the alternatives, including the preferred alternative, would change TAC amounts, methods, seasons, or areas closed to trawling.

Table 2 Resource components potentially affected by the alternatives

		Potentially Affected Component							
Alternatives	Physical	Habitat	Other Groundfish	Marine Mammals	Seabirds	Sablefish	Pacific Halibut	Ecosystem Component	Socio-economic
Alt 1	N	N	N	Y	Y	Y	N	N	Y
Alt 2 (Overall)	N	N	Y	Y	Y	Y	Y	N	Y
Alt 2 Element 1, Pot Limit	N	N	N	Y	Y	Y	N	N	Y
Alt 2 Element 2, Gear Retrieval	N	N	N	Y	Y	Y	N	N	Y
Alt 2 Element 3, Gear Specifications	N	N	N	Y	Y	Y	N	N	Y
Alt 2 Element 4, Halibut Retention	N	N	N	Y	Y	Y	Y	N	Y

N = no impact beyond status quo anticipated by the alternative on the component.
Y = an impact beyond status quo is possible if the alternative is implemented.

3.1 Sablefish

Biology:

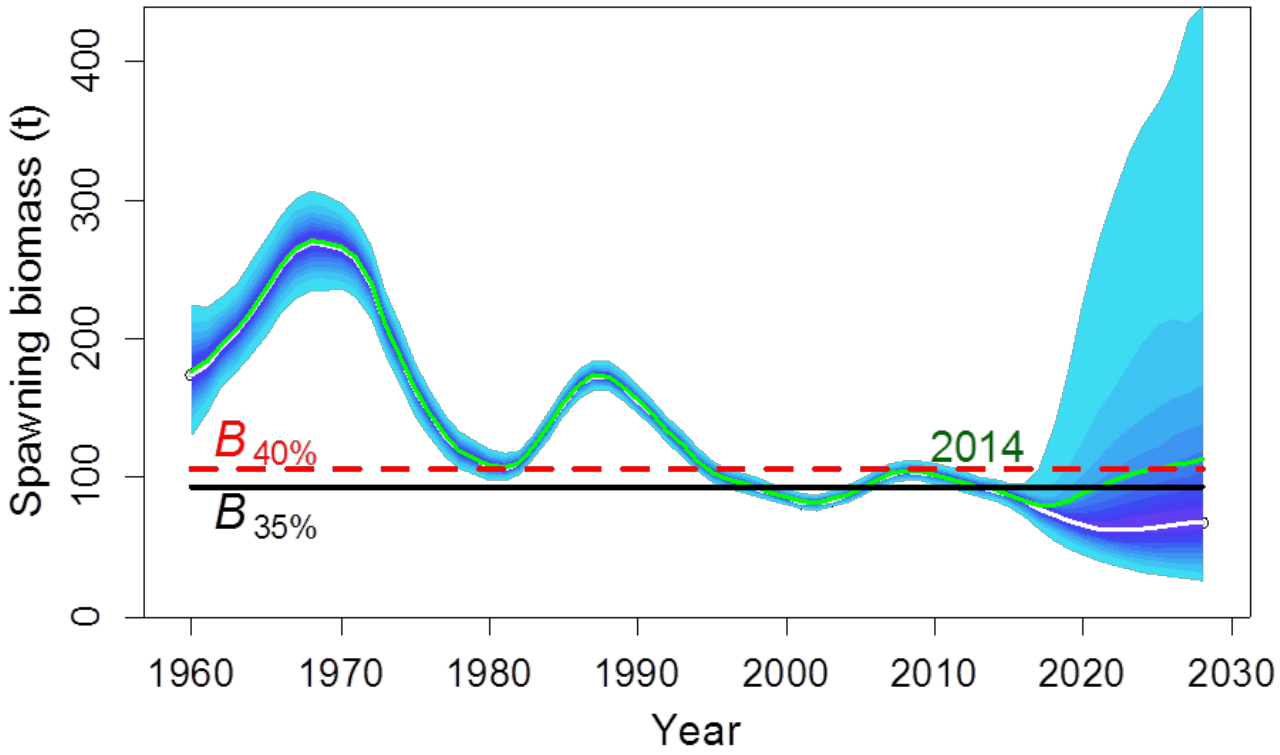
Sablefish distribution extends from northern Mexico through the GOA, the AI and into the BS. Adult sablefish are generally found at depths greater than 200 m along the continental slope, shelf gullies and deep fjords. Juvenile sablefish (less than 40 cm) spend the first 2-3 years farther inshore along the continental shelf and begin to move out to the continental slope around age 4. Young-of-the-year sablefish feed primarily on euphausiids and copepods while adults are more opportunistic feeders, relying more heavily on pollock, Pacific herring, Pacific cod, squid and jellyfish. Coho and Chinook salmon are the main predators of young-of-the-year sablefish.

Sablefish are relatively long lived. They begin to recruit to the fishery at age 4 or 5 and longevity often reaches 40 years (the oldest recorded sablefish in Alaska was 94 years old). Female size at 50 percent maturity is around 65 cm (approximately age 6.5). Females are slightly larger than males, and natural mortality is estimated at M = 0.10. Alaskan sablefish spawn at pelagic depths near the edges of the continental slope (300-500m) between January and April.

Stock Assessment:

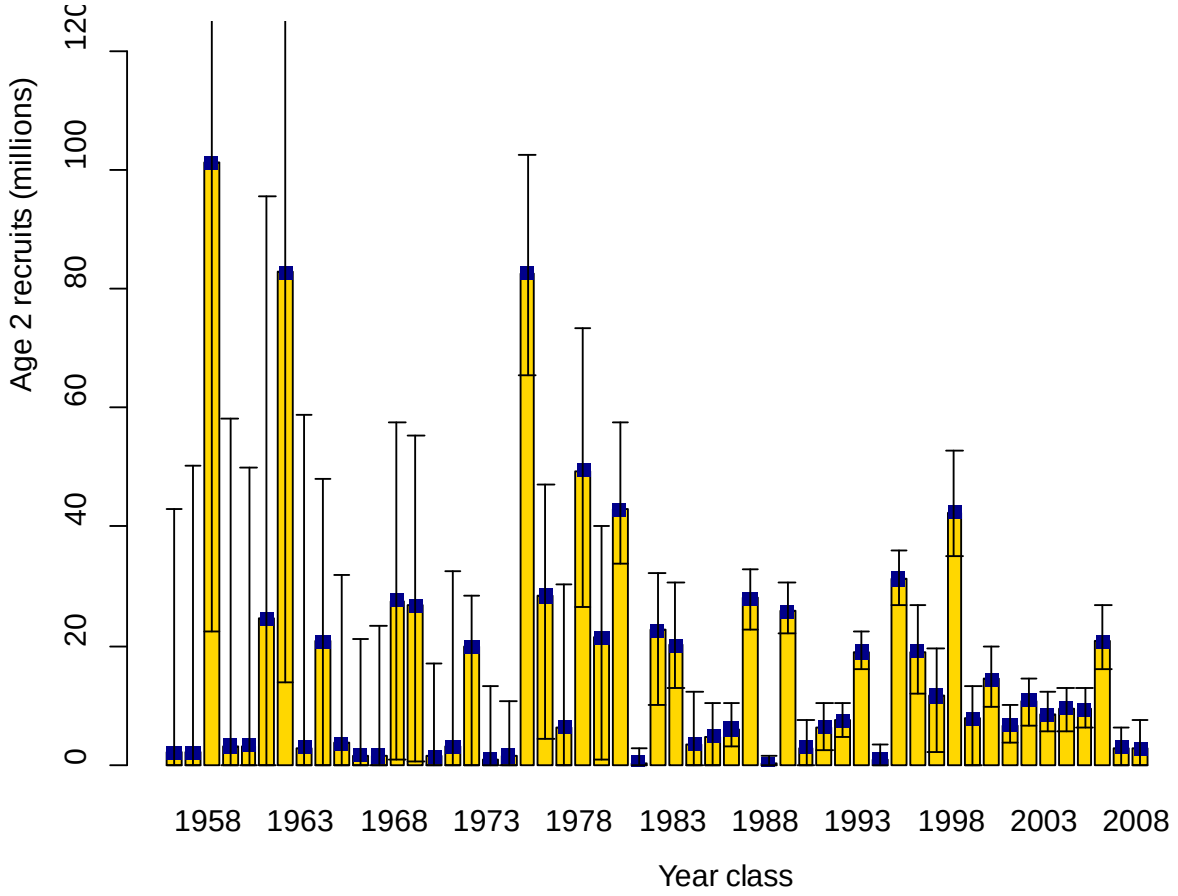
The sablefish assessment is based on a statistical sex-specific age-structured model. This model incorporates fishery data and fishery independent data from domestic and Japan-US cooperative longline surveys and the NMFS GOA trawl survey. Sablefish fall under Tier 3b of the ABC/OFL control rule. The 2013 age 4+ biomass was estimated to be 149,000 mt for the GOA. Spawning biomass has increased from a low of 30 percent of unfished biomass in 2002 to 34 percent projected for 2014 and is now trending downward (Figure 2). The 1997 year class has been an important contributor to the population but has been reduced and is expected to comprise less than 8 percent of the 2014 spawning biomass. The 2000 year class is still the largest contributor, with 18 percent of the spawning biomass in 2014. The 2008 year class is slightly above average and will comprise 8 percent of spawning biomass in 2014 even though it is only 40 percent mature (Figure 3).

Figure 2 Estimates of female spawning biomass (thousands t) and their uncertainty. White line is the median and green line is the mean, shaded fills are 5% increments of the posterior probability distribution of spawning biomass based on 10,000,000 MCMC simulations. Width of shaded area is the 95% credibility interval. Harvest policy is the same as the projections in Scenario 2 (Author's F).



Source: Hanselman et al. (NMFS, 2013)

Figure 3 Estimates of the number of age-2 sablefish (millions) with 95 percent confidence intervals by year class



Source: Hanselman et al. (NMFS, 2013)

Depredation of sablefish off of hook-and-line gear by killer whales is accounted for in the sablefish stock assessment by dropping depredated sets from the assessment. Sets that are depredated by sperm whales are included in the assessment, as sperm whale impact on the set is generally less severe. The Groundfish Plan Team is developing methods to incorporate sperm whale depredating into the assessment. The lead sablefish stock assessment author has provided the following description of the Team's efforts to account for sperm whale depredation off of sablefish longlines:

> *Sperm whales in the Gulf of Alaska depredate (remove or damage fish caught on fishing gear) on the annual National Marine Fisheries Service Alaska longline survey. Sperm whale depredation can reduce sablefish catch rates and increase the uncertainty of estimates of sablefish abundance and biomass derived from the longline survey. Prior studies that estimated the effect of sperm whale depredation were all fixed-effects models. However, the occurrence of whale depredation is sporadic – creating unbalanced data – and analysis of unbalanced designs using fixed-effects models can results in poor estimation and inference compared to mixed-effects models. In addition, the data within and among longline survey stations is likely correlated, which is also better handled with random effects. Thus, our first objective was to compare inferences across several fixed effects and mixed-effects models of sperm whale depredation. We used these results and simulations to select an appropriate model for inference. The second objective was to evaluate approaches for improved accounting of whale depredation in the sablefish stock assessment and sablefish management.*

From 1998-2012, a total of 1,154 year/station combinations were examined in sperm whale depredation models. Overall, 241 (21 percent) combinations were flagged for depredation based on sperm whale sightings as a proxy for depredation, while only 149 (13 percent) were flagged based on depredation evidence (damaged fish). Mixed effects models to estimate the sperm whale depredation effect performed better (based on simulations and comparison of point estimates and standard errors) than fixed effects models, likely due to the unbalanced nature and variation in the depredation data. Area-specific model results for sperm whale depredation varied by area; the greatest reductions in sablefish catch rates were generally seen in the West Yakutat and East Yakutat/Southeast areas (~17 percent - 23 percent reductions, $p < 0.05$). Models did not perform as well in regions with fewer data points, such as the Western Gulf of Alaska; therefore, mixed effects across-area models were selected as the most effective method for application in the annual sablefish stock assessment. Using the results of the area-wide model estimated expansions of catches at longline stations with sperm whales present by 1.14 and by 1.18 at stations where there was evidence of depredation. Because there were fewer incidents of evidence of depredation than presence, the effect on the all Alaska abundance index was similar for both variables and was an increase of 1-5 percent from 1998-2012. Compared to previous fixed effect studies, the use of mixed effect modelling and the longer time series of data showed that the effect of both presence and evidence of depredation had a significant effect on catch rates of sablefish on the Alaska longline survey.

Correcting for sperm whale depredation in the stock assessment resulted in an increase in estimated female spawning biomass of 3-4 percent in the terminal year which would yield an 8 percent higher quota recommendation. However, accounting for sperm whale depredation in the assessment should be done in concert with estimating the increase in mortality caused by depredation in the fishery. Current work is focused on estimating additional mortality caused by sperm whale depredation in the fishery.[5]

Fishery:

The fishing fleet for sablefish in the GOA is primarily composed of owner-operated vessels that use hook-and-line gear (pot gear is prohibited for directed sablefish fishing in the GOA). The sablefish IFQ fishery season opening date is concurrent with the halibut fishery for the purposes of reducing bycatch and regulatory discards between the two fisheries. The IFQ Program was designed, in part, to help improve safety for fishermen, enhance efficiency, reduce excessive investment in fishing capacity, and protect the owner-operator character of the fleet. The program set caps on the amount of quota share that any one person may hold, limited transfers to *bona fide* fishermen, issued quota in four vessel categories, and prohibited quota share transfers across vessel categories (Fissel et al., 2013).

The majority of the catch from sablefish fisheries in the GOA is taken with stationary lines, onto which baited hooks are attached. Gear components that contact the bottom include the anchors, groundline, gangions, and hooks. In the sablefish fishery, anchors are two-prong standard 50 lb to 90 lb anchors, and groundlines are generally constructed of 3/8-inch sinking line, with 6"to 18" long gangions of #72 to #86 twine, spaced 30" to 48" apart, with 9/0- 15/0 circle hooks. Some catcher vessels use snap-on gear with gangions spaced at 3 foot to 4 foot intervals. On catcher vessels, an average set consists of 20 skates of groundline, with each skate 100 fathoms to 150 fathoms long. Preferred baits are squid, pollock, and herring. Automatic baiting machines are used on many vessels.

The ends of each set are anchored and marked with buoys. The lower shot(s) (33 fathoms each) of the anchor line is (are) made of 3/4-inch floating poly, and the upper shot of line is made of 5/8-inch sinking

[5] D. Hanselman, 2015. Personal communication.

line. A buoy marks the beginning of a set, and a flag (up to 10 feet high) typically marks the end of a set ("bag and flag" set-up).

To make a set, the first anchor is dropped and the boat steams ahead with the groundline and baited hooks being set off the stern of the boat. The set is not made in a straight line; instead the boat will steer to ensure that the groundline is set in the preferred areas based on depth contour and bottom structure. The second anchor is deployed, and the line is left to fish for 5 hours to 24 hours depending upon the catch rates. Upon haulback, the groundline is fed through a hauler, and the fish are carefully taken off the hooks. Fish caught by catcher vessels are bled, packed in the round, or headed and gutted, and put in the hold on ice or slush-ice. Catcher processors freeze headed and gutted sablefish.

The sablefish longline fishery is prosecuted along the continental slope and deep gully areas on the shelf over gravel, cobble, and mud bottom at depths of 200 to more than 1,000 fathoms. This fishery is often a mixed halibut/sablefish fishery, with Greenland turbot, grenadiers, and shortraker, rougheye, and thornyhead rockfish also taken.

Fishery Management:

BSAI and GOA sablefish are managed as one population in Federal waters due to their highly migratory behavior during certain life history stages. There are four sablefish management areas in the GOA; Western (WGOA), Central (CGOA), and West Yakutat (WY) and Southeast Outside (SEO) districts in the Eastern GOA (EGOA). In 1985, Amendment 14 to the GOA Groundfish FMP allocated sablefish TAC by gear type; 80 percent to fixed gear (including pots, which were legal gear at the time), and 20 percent to trawl in the WGOA and CGOA, 95 percent to fixed gear and 5 percent to trawl gear in the EGOA.

Amendment 20 to the GOA FMP established IFQ management for the GOA sablefish fishery, which began in 1995. The IFQ Program assigns the privilege of harvesting a percentage of all sablefish quota share to specific individuals with a history of harvest in the fisheries, or those that purchased quota share. The quota share originally assigned to each person was proportional to their fixed gear landings, by management area, during the qualifying period, and are represented as quota shares (QS). Under this program, only persons holding QS are allowed to make commercial landings of sablefish in the management areas identified. There are several key provisions of the program: the process for initial allocation of QS by regulatory area; assignment of shares to vessel categories; share transfer provisions; use and ownership provisions; QS blocks to ensure small allocations are available for entry; the annual process for allocating QS; and the establishment of halibut and sablefish Community Development Quotas.

To qualify for an initial allocation of QS, a person must have made legal landings of sablefish, harvested with fixed gear, during 5 years of the 6-year base period 1985 through 1990. Each person eligible to receive QS had it assigned to one of three vessel categories: "A" – catcher/processor (freezer) vessels of any length; "B" – catcher vessels greater than 60'; "C" – catcher vessels less than or equal to 60'. Restrictions on transfer, together with use and ownership caps, were designed to maintain the owner/operator characteristics of the fleet, and to prevent consolidation of QS in the hands of a few participants.

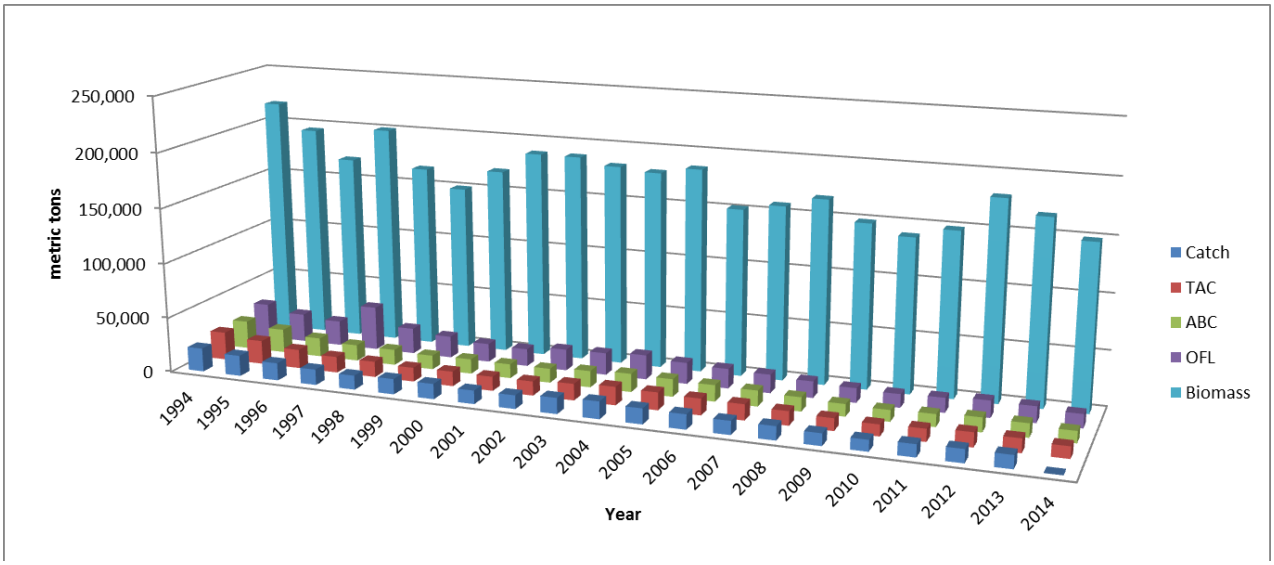
In 2010, there were 396 vessels that participated in the sablefish IFQ and CDQ fisheries in the GOA and BSAI. Of this total, 17 vessels participated in CDQ fisheries and 389 in sablefish IFQ fisheries. About 90 percent (357 vessels) of the sablefish fleet also participated in the halibut IFQ fisheries.

Catch History:

U.S. fishermen have harvested sablefish since the end of the 19th century as a byproduct of halibut fisheries. Harvests were relatively small, averaging 1,666 mt from 1930 through 1957. Japanese longlining began in the Eastern Bering Sea around 1958 and expanded into the AI and GOA through the 1970s. Japanese fleet catches increased throughout the 1960s, and peak sablefish catch reached 36,776 mt in 1972. High fishing pressure in the early 1970s by Japanese and USSR vessels may have resulted in a population decline of sablefish in the mid-1970s. By 1988, U.S. fishermen took the majority of the sablefish harvested in the GOA and BSAI. Sablefish was increasingly harvested as a derby-style fishery in the late 1980s and early 1990s until the IFQ Program was implemented for the HAL fishery in 1995.

Catch specifications for 2014 in the GOA are as follows; OFL = 12,500 mt, ABC = 10,572 mt, TAC = 10,572 mt. Separate ABCs and TACs are established for each GOA management area: WGOA, CGOA, WY, and SEO. Historical harvest specifications for GOA sablefish are depicted in Figure 4.

Figure 4 Sablefish Biomass, Overfishing Level, Acceptable Biological Catch, and Total Allowable Catch for 1994 through 2014 and Catch, 1994 through 2013



Source: Hanselman et al. (NMFS, 2013)

3.1.1 Effects of the Alternatives

The effects of the use of current and proposed gear in the sablefish IFQ hook-and-line fishery are addressed here. The GOA sablefish stock is assessed annually in the GOA SAFE report (Hanselman et al. 2013), and was also evaluated in the Alaska Groundfish Fisheries Harvest Specifications EIS (NMFS 2007a). Table 3 describes the criteria used to determine whether the impacts of this action on the GOA sablefish stock are likely to be significant. The sablefish stock is neither overfished nor subject to overfishing; GOA sablefish biomass levels are projected to decrease in the near future, due to a lack of recruitment (Figure 3). It is estimated that the GOA sablefish fishery under the status quo is sustainable.

Table 3 Criteria used to determine significance of effects on GOA sablefish, halibut, and groundfish

Effect	Criteria			
	Significantly Negative	Not Significant	Significantly Positive	Unknown
Stock Biomass: potential for increasing and reducing stock size	Changes in fishing mortality are expected to jeopardize the ability of the stock to sustain itself	Changes in fishing mortality are expected to maintain the stock's ability to sustain itself	Changes in fishing mortality are expected to enhance the stock's ability to sustain itself	Magnitude and/or direction of effects are unknown
Fishing mortality	Reasonably expected to jeopardize the capacity of the stock to yield sustainable biomass on a continuing basis.	Reasonably expected not to jeopardize the capacity of the stock to yield sustainable biomass on a continuing basis.	Action allows the stock to return to its unfished biomass.	Magnitude and/or direction of effects are unknown
Spatial or temporal distribution	Reasonably expected to adversely affect the distribution of harvested stocks either spatially or temporally such that it jeopardizes the ability of the stock to sustain itself.	Unlikely to affect the distribution of harvested stocks either spatially or temporally such that it has an effect on the ability of the stock to sustain itself.	Reasonably expected to positively affect the harvested stocks through spatial or temporal increases in abundance such that it enhances the ability of the stock to sustain itself.	Magnitude and/or direction of effects are unknown

3.1.1.1 Alternative 1: No Action

Alternative 1 would maintain the current prohibition of the use of pot gear (single or longline) in the GOA. Continued use of currently permitted gear would not decrease fishing mortality on sablefish, as hooked fish would continue to be predated upon by whales. Efforts to better quantify whale depredation mortality are underway. While unknown, annual mortality of sablefish by whale depredation on HAL gear is gauged to be on the order of a few hundred tons. Whale predation may occur on 5 percent to 10 percent of sets, but could be as high as 30 percent to 40 percent on an individual set of longline gear. Generally, sperm whale depredation occurs in the CGOA and Eastern GOA (WY and SEO), while killer whale depredation occurs in the W GOA. The sablefish stock assessment authors have observed that continued recruitment failure likely dwarfs unaccounted sablefish mortality due to whale depredation. Therefore, Alternative 1 would have an insignificant effect on the sablefish population.

Taking no action would not address the stated purpose and need for the action. The Council has identified the need to maximize the ability of sablefish QS holders to harvest their sablefish IFQ by increasing catch per unit of effort and reducing costs that are associated with whale avoidance; this concern is further addressed in Section 4.

3.1.1.2 Alternative 2: Preferred Alternative

Alternative 2 is the Council's preferred alternative. Alternative 2 would allow, but not require, pot longline gear for use in the sablefish IFQ fishery in the GOA. The effects of using pot longline gear to harvest the sablefish stock would be proportionate to the actual adoption of that gear type. The amount of sablefish that would have been lost to depredation, but that could be expected to survive under Alternative 2, is unknown but assumed to be proportionate to use of pot longline gear. Under the proposed action, cumulative sablefish IFQ catch would not be permitted to exceed the sablefish TAC.

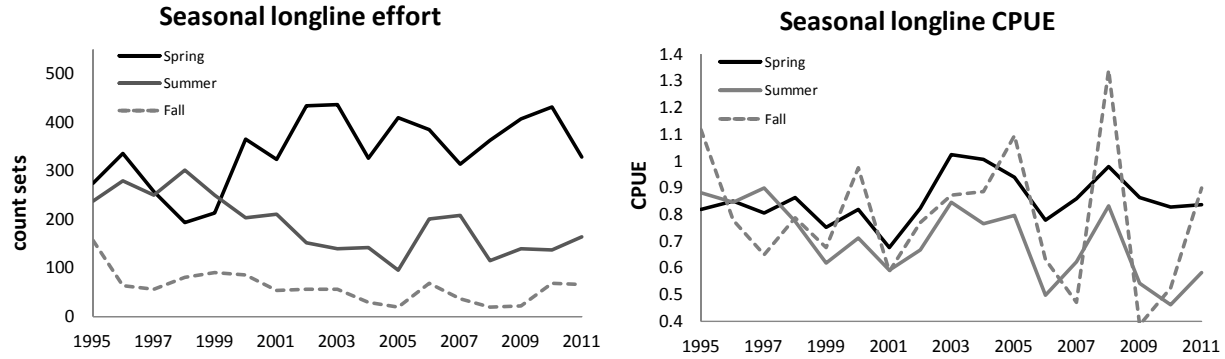
The following information on catch rates, spatial and temporal patterns, length frequencies, diet, and sample size of sablefish caught in pots (longline and pot-and-line) in the BSAI was requested by the

Council and presented in a discussion paper published in December 2013[6]. Information from the BSAI is the only available data on sablefish caught in pots off Alaska, and is presented for purposes of completeness.

Catch rates:

The sablefish stock assessment authors have examined fishery hook-and-line (HAL) data for seasonal and annual differences in effort and catch rate (CPUE, lbs./hook). Such changes may cause fishery catch rates to be unrepresentative of abundance. In the observed HAL data since 2000, the majority of effort occurs in the spring and less in the summer and fall (Figure 5). Since 1998, catch rates are also highest in the spring, moderate in the summer, and variable in the fall (due to lower sample sizes in the fall).

Figure 5 Fishery longline (HAL) data for seasonal and annual differences in effort and catch rate



Source: Hanselman et al. (NMFS, 2013)

Data from pot gear only are available from the BS and AI, and cannot be distinguished between single and longline pot gear. Because pot data is sparser than HAL data, and is confidential in some years, specific annual data are not presented. It is also difficult to discern trends, since pot catch rates have wider confidence intervals than HAL data due to their smaller sample sizes. Overall, there are more vessels reporting in both the logbook and observer data in the BS than the AI in the sablefish pot fishery. Since 2006, in the annual BS logbook data there have been between 5 and 9 vessels reporting, and between 5 and 8 vessels reporting in observer data. In the AI, there have been 1 and 5 vessels reporting in logbooks, and between 1 and 4 vessels reporting in observer data. In 2012, the total number of vessels and sets reported was down; this decrease was greater in the AI. From 2006 through 2012 the average catch rate in logbook data was 26 lbs./pot in the AI (number sets (n) = 710) and 25 lbs./pot in the BS (n = 5,334). In observer data the average catch rate was 11 lbs./pot (n = 1,156) in the AI and 19 lbs./pot (n = 2,885) in the BS. There is approximately equal effort in all seasons.

Because of the high variability, catch rates within management areas were not significantly different between any years in both the observer and logbook data. For both the BS and AI areas, no trend in catch rates is discernible. The composition of species caught in pots in the BSAI was similar in 2005. Sablefish comprised most of the catch by weight (BS = 60 percent, AI = 69 percent) and the next most abundant fish by weight was arrowtooth flounder (BS = 13 percent, AI = 10 percent). Other species of fish and invertebrates contributed no more than 6 percent each to the total catch weight.

[6] https://npfmc.legistar.com/View.ashx?M=F&ID=2724871&GUID=A22B0F15-6383-4369-A261-CEB8291244BA .

Spatial and temporal patterns:

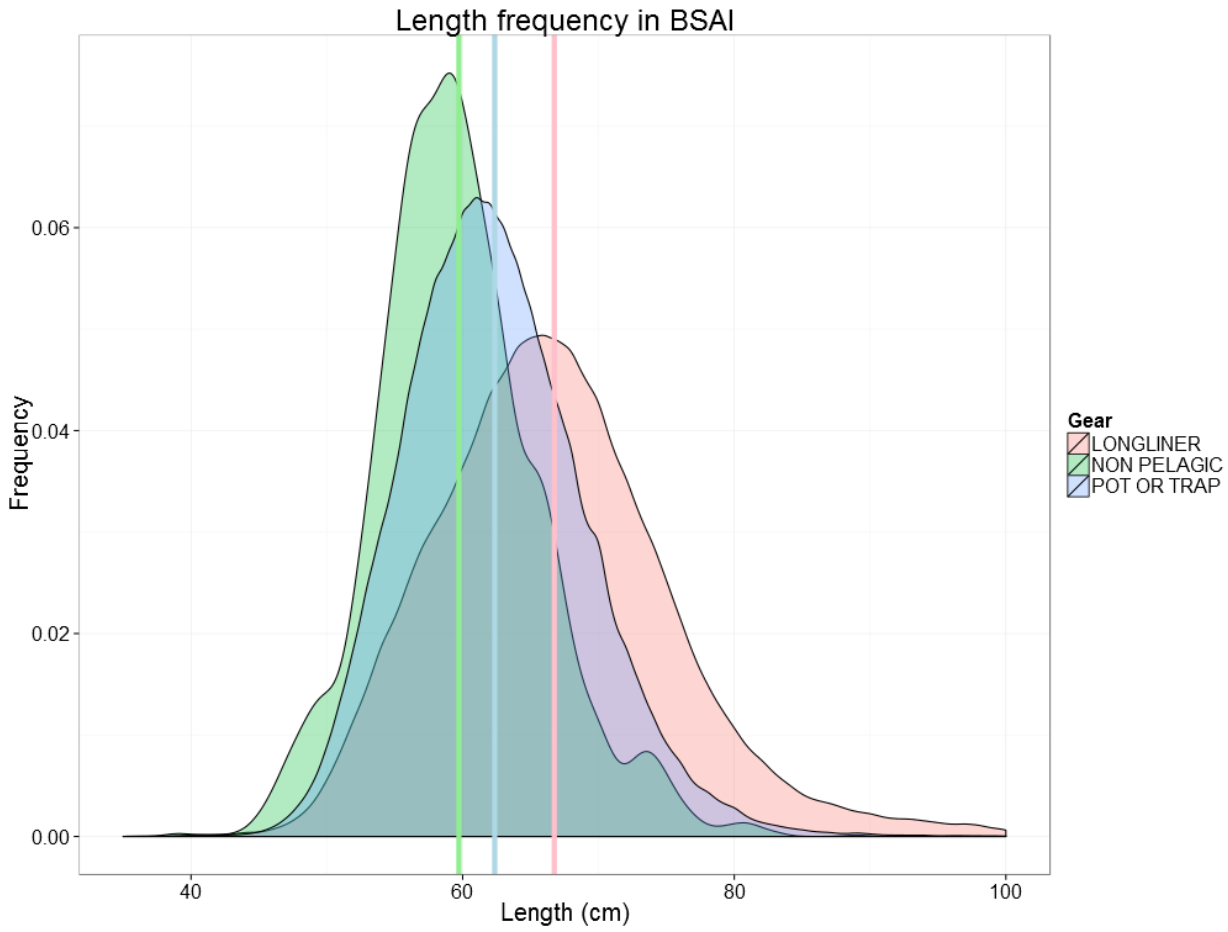
Seasonal changes in effort were examined in the 2007 SAFE Report, but no distinct trends were found.

Length frequencies:

The stock assessment authors have compared the length frequencies recorded by observers in BS and AI sablefish pot and HAL fisheries. An earlier version of this analysis reported that the average length of sablefish caught in the BSAI between 2006 and 2008 was smaller for sablefish caught by pot gear (25.1 inches) than HAL longline gear (26.0 inches), but the distributions indicate that both fisheries focus primarily on adults. The five most recent years of data (2010 through 2014) show a mean length of 23.8 inches for pot gear and 27.6 inches for HAL gear, with the difference being greater in AI than in BS. The authors state that there is enough data in the study to consider this difference to be of statistical significance. Figure 6 shows sablefish length frequencies for pot, HAL, and non-pelagic trawl fishing in BSAI. It should be noted that the difference in sablefish length could be attributed, in part, to fishing in different areas. Over the 2010 through 2014 period, pot gear effort was relatively concentrated in the eastern portions of the AI and BS areas, while HAL effort occurred more in the western portions and was generally more spread out. Depth does not appear to be a significant predictor of sablefish length (Hanselman, pers. comm., 2015).

Pot and longline gear are set at similar depths in the BSAI and sex ratio of the catch is 1:1 in both gears. The authors do not believe that the difference in lengths is significant enough to affect population recruitment and did not see any indication that undersized fish were being selected by pots.

Figure 6 Sablefish length frequencies (cm) for HAL (longliner), pot, and non-pelagic trawl in BSAI commercial IFQ fisheries, 1991-2014



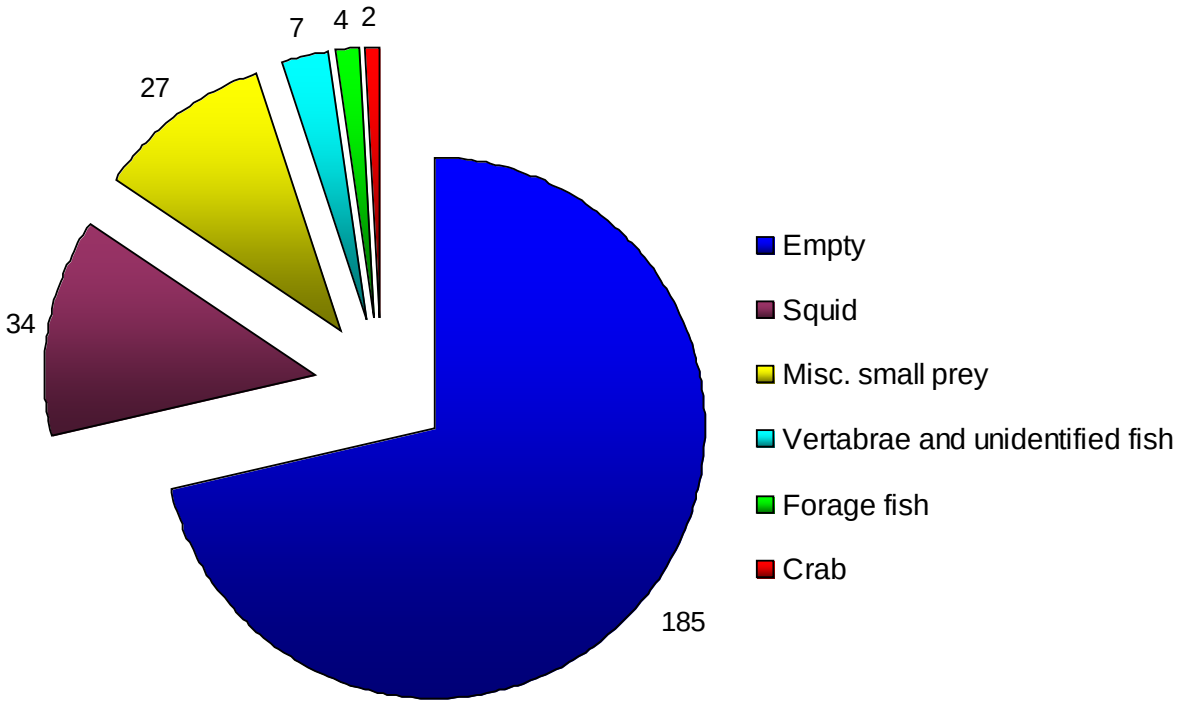
Source: D. Hanselman, 2015. Personal communication

Sablefish diets:

In December 2005, the Council requested that the stock assessment authors investigate the possibility of sablefish cannibalism in the BSAI pot fishery. Because few small sablefish are found in pots, there was concern that small sablefish were entering the pots and being cannibalized by larger sablefish.

A total of 257 sablefish stomachs were examined during 2006 and 2007 at sea and in plants in Dutch Harbor, AK. Of these sablefish, 80 percent were females (attributed to selecting fish greater than 65 cm). A total of 72 percent of the stomachs sampled were empty. The prey item that occurred most commonly was squid (13 percent), followed by miscellaneous small prey less than 15 cm (10 percent), vertebrae and unidentified digested fish (3 percent), forage fish (2 percent), and crab (1 percent). Some of the squid in the stomachs were noted to be bait from the pots. Miscellaneous small prey included brittle stars and unidentified small prey. The frequency of prey occurrence (out of 257 stomachs) is detailed in Figure 7.

Figure 7 Stomach contents of sablefish samples in 2006 and 2007, Dutch Harbor. (Source: GOA Safe Report, 2008)[7]



No sablefish were found in the stomachs of large pot-caught sablefish. Several caveats exist to these results. The authors were not provided with the soak time of these pots, so it is possible some of the vertebrae were from digested sablefish. However, sablefish in a benthic environment would likely be at least 35 cm (age 2+) and would take some time to digest to the point of becoming unidentifiable vertebrae. In addition, some stomach contents may have been regurgitated when the pots were retrieved. However, because no sablefish were present in the stomach samples, cannibalism in pots either does not occur or is a rare event.

Pot sample sizes:

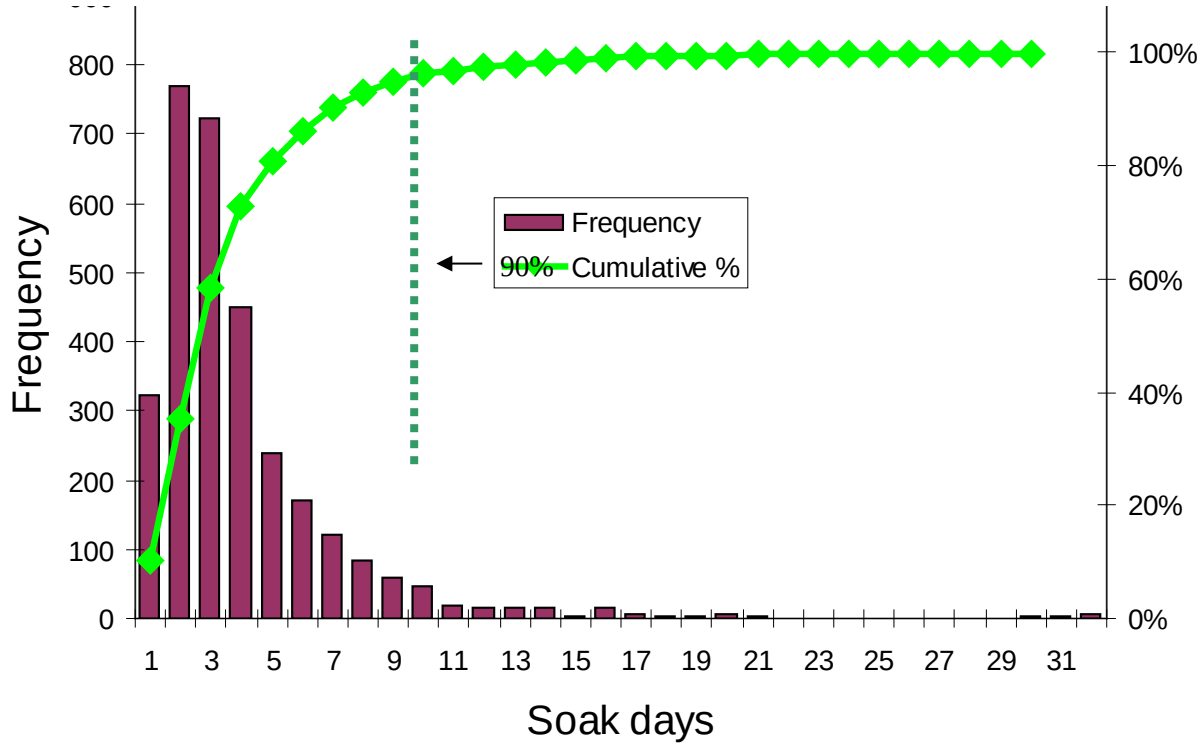
Sablefish pot fishing has increased dramatically in the BS and AI since 1999. In 2007, pot gear accounted for 81 percent of the BS fixed gear sablefish and halibut IFQ catch, and 56 percent of the AI sablefish and halibut IFQ catch. Fishery catch and effort data for pot gear are available from observer data since 1999; however, due to confidentiality agreements, the authors cannot present these data due to low sample sizes. Pot fishery data are also available from logbooks since 2004; however, these data are also sparse. The number of observed sets and the number of pots fished increased dramatically in 2005 and remained high through 2007. The number of logbook pot sets has continued to increase in the BS and has stayed consistent in the AI. Overall years, the average number of pots used per set was 78.

In 2006, some questions were raised about storing pots at sea, pot escape rings, and biodegradable panels. While the consequences of these potential regulatory provisions were not analyzed, the soak times of observed pot sets were examined in 2006. From 1999 through 2005, 90 percent of the observed pot sets in the BSAI were soaked for seven or fewer days (Figure 8).

[7] Available at http://www.afsc.noaa.gov/refm/docs/2008/sablefishgoa.pdf

In an experiment examining escape mechanisms for Canadian sablefish, Scarsbrook et al. (1988) showed that in their control pots fish had only 5 percent mortality up to 10 days.

Figure 8 Number of soak days for 1999-2005 BSAI pot fisheries. (Source: GOA Safe Report, 2008)[8]



The Council's Sablefish Gear Committee convened in December 2013 to consider the staff discussion paper on this action, provide information on a number of gear issues related to the action, and recommend alternatives for analysis[9]. The committee opined that overall HAL longline gear is more effective (higher CPUE) than pot longline gear due to regular spacing of hooks versus pot "bait bombs" every 50 fathoms.

The Council requested that the sablefish stock assessment authors evaluate the impacts of Alternative 2 on their ability to assess the status of the sablefish stock. The stock assessment authors report that development of a fishery index of abundance for pot gear would remain unlikely. The introduction of pot longline gear in the GOA would complicate progress toward an improved HAL longline fishery index of abundance, as IFQ fishermen trade HAL longline gear for pot longline gear. A second consideration is whether the fish size selectivity of the pot longline gear would be vastly different from HAL longline gear. Presently the two gear types are combined for assessment purposes in the BS because of a lack of measured difference. However, GOA sablefish are known to generally be larger, and some differences based on escape ring size and depths at which the pot longline gear is fished may become evident. In summary, fish length and possibly age composition would be needed from the new gear type before the stock assessment authors could evaluate the potential effects on the sablefish stock and stock assessment.

Conclusions:

There are no significant impacts identified for sablefish. Some (unquantified) benefit would occur under Alternative 2 (preferred alternative). Unaccounted fishing mortality due to whale depredation would be

[8] Available at http://www.afsc.noaa.gov/refm/docs/2008/sablefishgoa.pdf
[9] http://www.npfmc.org/wp-content/PDFdocuments/catch_shares/SablefishGearMin_9-30-13.pdf

reduced as sablefish IFQ fishermen voluntarily switch from HAL longline gear to pot longline gear, but that effect would be masked by a recent lack of recruitment to the stock (Figure 3). Additional reductions in mortality would accrue to species also caught by sablefish IFQ fishermen using HAL gear, such as grenadiers, Pacific halibut, and other groundfish (see Section 3.3). 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 (Figure 6). However, this evidence was observed at the BSAI area-wide level, so some of the difference could be attributed to sub-area location. In any case, existing evidence does not suggest that pot longline gear would sort for larger sablefish to a degree that would significantly affect the stock's recruitment model.

3.2 Pacific Halibut

Biology:

Pacific halibut is a flatfish which inhabits the continental shelf of the United States and Canada, ranging from California to the Bering Sea, and extends into Russia and Japan (IPHC 1998). As described by ADF&G[10] and IPHC[11], most male halibut are sexually mature by about 8 years of age, while half of the females are mature by about age 12. Most halibut spawn during the period November through March, at depths of 300 to 1,500 feet. Female halibut release a few thousand eggs to several million eggs, depending on the size of the fish. Eggs are fertilized externally by the males. About 15 days later, the eggs hatch and the larvae drift with deep ocean currents. As the larvae mature, they move higher in the water column and ride the surface currents to shallower, more nourishing coastal waters. In the GOA, the eggs and larvae are carried generally westward with the Alaska Coastal Current and may be transported hundreds of miles from the spawning ground. Halibut larvae start life in an upright position like other fish, with an eye on each side of the head. The left eye moves to the right side of the head when the larvae are about one inch long. At the same time, the coloration on the left side of the body fades. The fish end up with both eyes on the pigmented (olive to dark brown), or right, or upper side of the body, while their underside is white. By the age of 6 months, young halibut settle to the bottom in shallow nearshore areas.

Halibut feed on plankton during their first year of life. Young halibut (1 to 3 years old) feed on euphausids (small shrimp-like crustaceans) and small fish. As halibut grow, fish make up a larger part of their diet. Larger halibut eat other fish, such as herring, sand lance, capelin, smelt, pollock, sablefish, cod, and rockfish. They also consume octopus, crabs, and clams.

Female halibut grow faster and reach larger sizes than male halibut. The growth rate of halibut has changed over time. Both females and male halibut have the potential to grow rapidly until about age 10, about 2 inches per year for males and 2.5 inches for females. Thereafter, females have the potential to grow even faster, while males generally would slow down relative to female growth.

The growth rate was highest in the 1980s and lowest in the 1920s and 2000s. Sometime around 1980, growth rates started to drop, and now Alaska halibut of a given age and sex are about the same size as they were in the 1920s. For example, in the northern GOA, an 11-year-old female halibut weighed about 20 pounds in the 1920s, nearly 50 pounds in the 1970s, and now again about 20 pounds. For at least the past 15 years, halibut growth rates have been depressed to levels that have not been seen since the 1920s. Growth rates for larger fish in the last 10 or so years are more on the order of one inch or less per year. This translates into a much smaller fish at any given age.

[10] http://www.adfg.alaska.gov/index.cfm?adfg=halibut.main

[11] http://www.iphc.int/publications/rara/2010/2010.261.Evaluationoftheimpactofmigrationonlostyield.pdf

By the 2000s, 12-year-old halibut were about three-quarters the length and about one-half the weight they were in the 1980s. In the late 2000s, 15-year-old female halibut in the CGOA have averaged 28 pounds, a decline of 70 percent in 30 years. Similar, though slightly smaller, declines have been noted in all areas. The declines in size at age occur at all ages and for both sexes; the declines increase markedly with age. The reasons for both the increase and the decrease in growth rate are not yet known, but may be tied to increased abundance of other species, such as arrowtooth flounder, and availability of food supply. The growth rate is believed to decrease due to competition for prey among halibut or between halibut and other species, such as arrowtooth flounder, that have a similar diet.

Halibut tagged in the BS have been caught as far south as the coast of Oregon, a migration of over 2,000 miles. Because of the extensive movements of juvenile and adult halibut, the entire Eastern Pacific population is treated as a single stock for purposes of assessment. Research is continuing to determine if there are spawning sub-stocks of varying productivity.

Halibut also move seasonally between shallow waters and deep waters. Mature fish move to deeper offshore areas in the fall to spawn, and return to nearshore feeding areas in early summer. It is not yet clear if fish return to the same areas to spawn or feed year after year.

Halibut abundance changes along its geographic range, with the current center of abundance located around Kodiak Island (Area 3A) in the GOA. During summer, halibut are distributed on the continental shelf but during the winter mature halibut migrate to spawning grounds located in deeper waters. Recent archival tagging has identified winter spawning migrations as long as 1200 km as well as some degree of site fidelity to summer areas. After spawning, halibut eggs and larvae are carried by prevailing currents north and westward towards the WGOA and the BS. Juvenile halibut undertake an ontogenetic eastward-southward migration that counters the drift of eggs and larvae.

Status of the Stock:

The stock assessment for Pacific halibut showed that the stock has been declining continuously since 1997. The decline is two-fold: decreasing size at age (mature fish are generally smaller than in the past) and poor recruitment strengths (lower numbers of fish "recruiting" to legal-size). Despite this, the exploitable biomass and female spawning biomass seem to have plateaued over the last few years. Female spawning biomass is estimated to have increased from 190 million lbs. in 2011, to 197 million lbs. in 2012, with a projected further increase to 201 million lbs. in 2013 (Figure 9). Trends in survey abundance are provided by halibut regulatory area (Figure 10).

The assessment concludes that incoming recruitments to the population are likely to be low; size-at-age changes slowly and is currently low; the stock trend is projected to be relatively flat or declining in the near-term; and stock response to management actions may increase, as the stock stabilizes at lower biomass levels.

Figure 9 Estimates of female spawning biomass (thousands mt) Source: IPHC (2013)

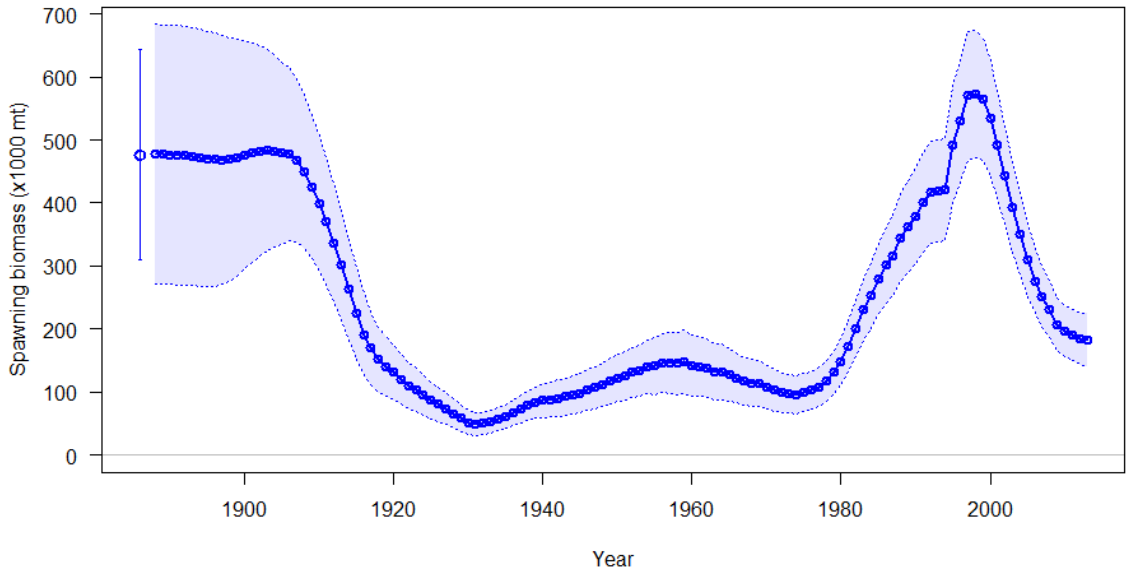
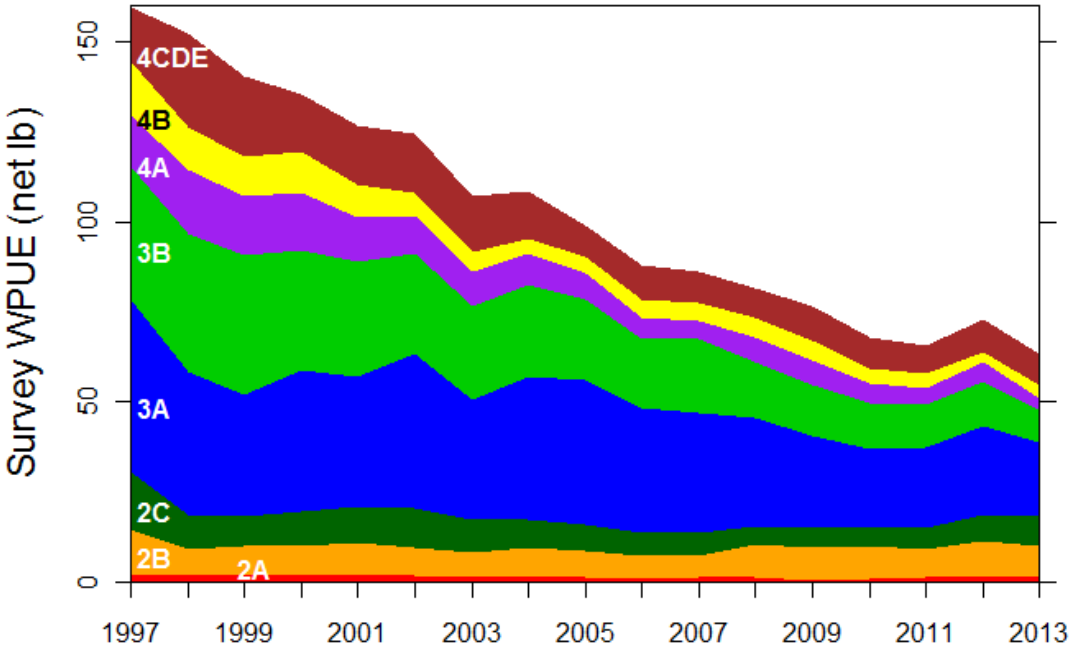


Figure 10 Pacific halibut survey trends by halibut regulatory area (Source: IPHC)



Fishery Management:

Pacific halibut fisheries are regulated by the IPHC (in compliance with the terms of the Northern Pacific Halibut Act between the United States and Canada) and the Council. In practice, the IPHC establishes total annual catch limits and other conservation measures by regulatory area, and the Council develops regulations to govern the fishery including limited access and allocation decisions (Figure 11).

The Pacific halibut fixed gear fishery (together with the sablefish fixed gear fishery) has been managed under an IFQ Program since 1995; the IFQ Program is summarized under Section 3.1.
The total 2013 catch from the IFQ/CDQ halibut fishery for the waters off Alaska was 22 million lbs., 5 percent under the catch limit (Table 4). For comparison, the 2012 commercial catch was 3 percent under the catch limit. For Areas 2C and 3A, the commercial QS catches were under the catch limits by 2 percent. Area 3B was 6 percent under its catch limit.

The fishing fleet for halibut is primarily composed of owner-operated vessels that use HAL longline gear (pot and trawl gear are prohibited). The halibut IFQ fishery season opening date is set by the IPHC, and typically occurs between March and November; the 2014 season ran March 8 through November 7.

Figure 11 Pacific halibut regulatory areas. Shaded region indicates the Exclusive Economic Zone of the United States and Canada. (Source: IPHC)

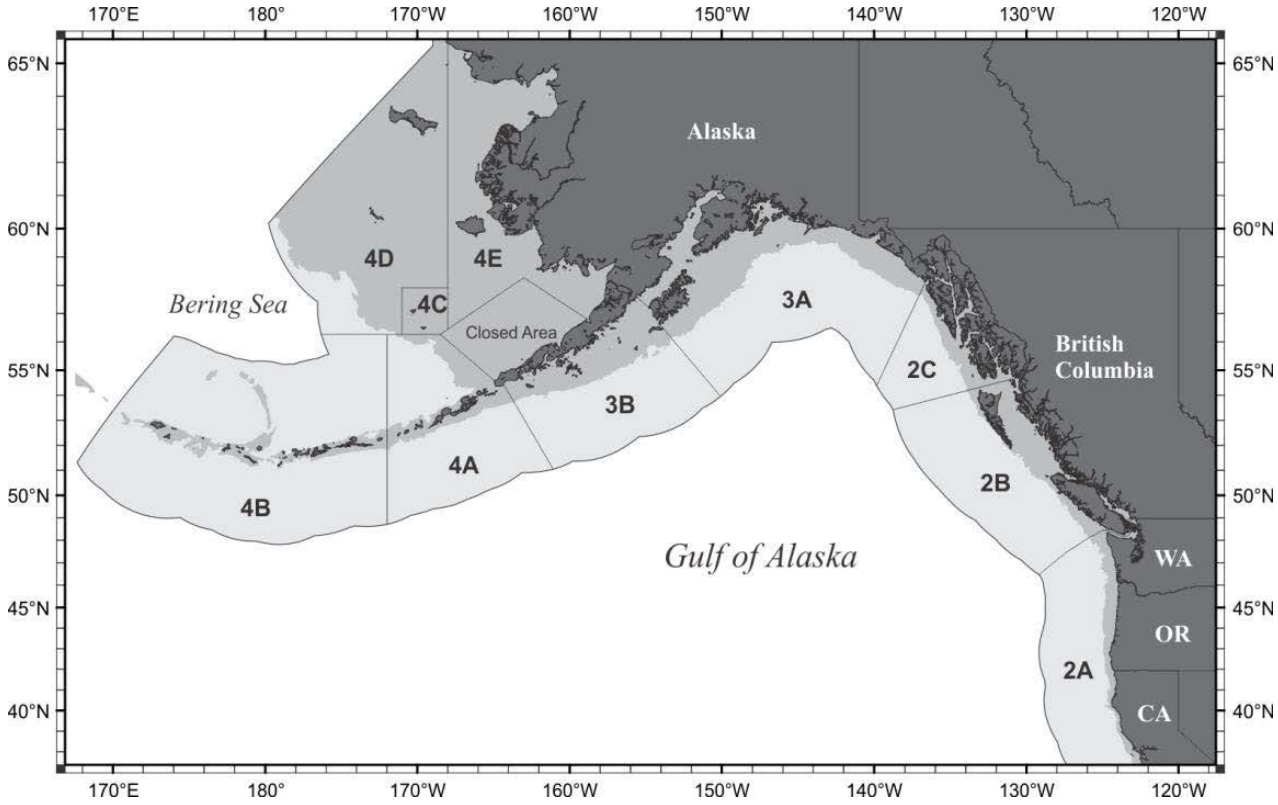


Table 4 Commercial catch (including IPHC research catch) and catch limits of Pacific halibut (in thousands of pounds, net weight) by IPHC regulatory area, 2004 - 2013. (Source: IPHC)

Regulatory Area	Commercial Catch[1]									
	2004	2005	2006	2007	2008	2009	2010	2011	2012[2]	2013[3]
2A[4]	884	803	829	789	682	490	418	541	573	544
2B	12,162	12,331	12,005	9,772	7,756	6,637	6,729	6,692	5,983	5,919
2C	10,233	10,625	10,492	8,473	6,206	4,955	4,486	2,454	2,694	3,037
3A	25,168	26,033	25,714	26,493	24,521	21,755	20,502	14,669	12,032	11,050
3B	15,460	13,171	10,792	9,249	19,748	10,781	10,114	7,321	5,045	4,116
4A	3,562	3,404	3,332	2,828	3,015	2,528	2,325	2,351	1,583	1,233
4B	2,719	1,975	1,590	1,416	1,763	1,593	1,829	2,054	1,738	1,237
4C[5]	954	534	493	551	724	645	789	790	563	513
4D[5,6]	1,655	2,578	2,368	2,720	2,552	2,210	2,116	2,182	1,431	982
4E[6,7]	314	369	366[7]	579	600	455	410	457	347	280[7]
Total	73,111	71,823	67,981	62,870	58,567	52,049	49,718	39,511	31,989	28,911
Regulatory Area	Commercial Catch Limits[8]									
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
2A[4]	890.4	788.6	818.5	799.2	718.4	511.2	420.0	480.7	546.6	573.8
2B	12,141.0	11,658.0	11,631.0	10,089.4	7,918	6,711.6	6,598.6	6,702.2	5,953.4	5,958
2C	10,500.0	10,930.0	10,630.0	8,510.0	6,210.0	5,020.0	4,400.0	2,330.0	2,624.0	2,970
3A	25,060.0	25,470.0	25,200.0	26,200.0	24,220.0	21,700.0	19,990.0	14,360.0	11,918.0	11,030
3B	15,600.0	13,150.0	10,860.0	9,220.0	10,900.0	10,900.0	9,900.0	7,510.0	5,070.0	4,290
4A	3,470.0	3,440.0	3,350.0	2,890.0	3,100.0	2,550.0	2,330.0	2,410.0	1,567.0	1,330
4B	2,810.0	2,260.0	1,670.0	1,440.0	1,860.0	1,870.0	2,160.0	2,180.0	1,869.0	1,450
4C	1,720.0	1,815.0	1,610.0	1,866.5	1,769.0	1,569.0	1,625.0	1,690.0	1,107.0	859
4D	1,720.0	1,815.0	1,610.0	1,866.5	1,769.0	1,569.0	1,625.0	1,690.0	1,107.0	859
4E	345.0	359.0	330.0	367.0	352.0	322.0	330.0	340.0	250.0	212
Total	74, 256.4	71,685.6	67,709.5	63,248.6	58,816.4	52,722.8	49,378.6	39,692.9	32,012.0	29,531.8

[1] Commercial catch includes IPHC research catch and, in Area 2C, the Metlakatla fishery catch.
[2] Poundage figures have been updated from previous publications.
[3] Preliminary (as of November 11, 2013).
[4] Does not include treaty Indian ceremonial and subsistence fish.
[5] Area 4C IFQ and CDQ could be fished in Area 4D (since 2005).
[6] Area 4D CDQ could be fished in Area 4E.
[7] Area 4E includes research catch in the IPHC Closed Area.
[8] Additional carryover from the underage/overage plans is not included.

Catch History:

The halibut fisheries are prosecuted with stationary groundlines, onto which baited hooks are attached. Gear in the halibut fishery can vary somewhat across vessels. In most cases, anchors are two-prong standard 50 pound anchors, and groundlines are generally constructed of 3/8-inch sinking line, with gangions of #72 to #86 twine, and 14/0 - 16/0 circle hooks. Some catcher vessels use snap-on gear with 3 foot to 4 foot long gangions spaced at 10 foot to 20 foot intervals. Some vessels use stuck gear (not snap on) with 12 inch to 16 inch gangions spaced at 10 foot to 20 foot intervals. Other vessels use combination gear (used to target both halibut and sablefish) with shorter gangions, shorter hook spacing (4 feet to 6 feet), and smaller hooks (13/0-15/0). Automatic baiting machines are used on many vessels. An average set consists of 10 to 20 skates of groundline, with each skate 100 fathoms to 150 fathoms long. Squid and herring are the preferred baits, although pink salmon and Pacific cod may also be used. The ends of each set are anchored and marked with buoys. The lower shot(s) (33 fathoms each) of the anchor line is (are) made of up to 3/4-inch floating poly, and the upper shot of line is made of up to 5/8-inch sinking line. A buoy marks the beginning of a set, and a flag (up to 10 feet high) typically marks the end of a set ("bag and flag" set-up).

To make a set, the first anchor is dropped and the boat steams ahead with the groundline and baited hooks being set off the stern of the boat. The set is not necessarily made in a straight line; rather, the boat will steer to ensure that the groundline is set in the preferred areas based on depth contour and bottom structure. The second anchor is deployed, and the line is left to fish for 5 hours to 24 hours, depending upon the catch rates. Upon haulback, the groundline is fed through a hauler, and the fish are carefully taken off the hooks. The fish are bled and gutted, and put on ice, or in a hold of slush-ice on shorter trips.

Halibut fishing grounds occur throughout the entire GOA shelf and AI shelf area. In the Eastern BS, halibut are taken in the upper slope area and the shelf area in the immediate vicinity of the Pribilof Islands. Although halibut have been caught as deep as 550 m, they are most often caught between 25 m and 275 m.

Many of the 1,060 vessels that fish halibut also participate in other fleets; 357 vessels in the sablefish fleet, 61 vessels in the longline groundfish fleet, 53 vessels in the groundfish pot fleet, and a few vessels that participate in almost every other Federal fishery.

Bycatch:

In general, observer coverage of fisheries in the GOA has been lower than in the BSAI, resulting in poorly estimated halibut bycatch. Most vessels either operate in state waters where there are minimal, if any, observer coverage requirements, or are less than the 40 feet in length overall (LOA) minimum size threshold for observer coverage in Federal waters. IPHC summarized NMFS-reported data on bycatch by hook-and-line vessels fishing in the Federal waters for 2013. These vessels primarily target Pacific cod (*Gadus macrocephalus*). A minor amount of bycatch by vessels fishing in the Federal sablefish IFQ fishery is also included.

Bycatch mortality in Area 3 (EGOA, CGOA, and WGOA) in 2013 was estimated at 2.3 million lbs., a decrease of 33 percent from 2012 (Figure 12). This is a large change between two years, one of the biggest observed. Bycatch is estimated to have decreased in both Area 3A and 3B, with the biggest drop occurring in Area 3B. Decreases were noted in both trawl and hook-and-line fisheries. The total for Area 3 is below the 10-year average of 4.3 million pounds.

Trawl fishery bycatch was 79 percent of the total bycatch in the area, estimated at 1.8 million pounds. Area 3A accounted for 1.2 million pounds of this total, with the remainder (0.6 million pounds) from Area 3B. Target fisheries for arrowtooth flounder (*Atheresthes stomias*) and flatfish (primarily rock sole (*Lepidopsetta* spp.) and yellowfin sole (Limanda aspera)), accounted for over half of the trawl bycatch in Area 3. Roughly 75 percent of this mortality was taken in Area 3A.

Bycatch mortality in hook-and-line fisheries primarily occurs in target fisheries for Pacific cod (*Gadus macrocephalus*). Since 2006, slightly more than half of the annual bycatch mortality from this fishery has usually been taken in Area 3B. The cod fishery occurs in January through March, when halibut tend to be in deeper water for spawning and cod are schooling in shallow water.

Figure 13 depicts total halibut PSC (mt) and rate (kg/mt) for 2004 through 2013, for total groundfish excluding and including pollock catch. Pollock catch is excluded in the top panel because it comprises a large amount of total groundfish catch, and its associated halibut bycatch is minimal, thus masking both halibut discards and mortality in other groundfish fisheries. The bottom panel of the figure best demonstrates the effect the of the Council's proposed action to decrease halibut discards and mortality.

Halibut managers have emphasized bycatch reduction of halibut in non-target fisheries in recent management initiatives. The Council and IPHC co-sponsored a workshop on Halibut Bycatch Estimation,

Halibut Growth and Migration, and Effects on Harvest Strategy in April 2012. Participants reviewed the methodology and accuracy of the estimation of Pacific halibut bycatch in trawl/longline groundfish fisheries off Alaska, and the impacts of halibut bycatch on the halibut stock as a whole and by area, given the current understanding of halibut migration. The workshop also discussed general halibut ecology, including recent trends in exploitable biomass, spawning biomass, and size at age, and information concerning the causes and implications of declining size at age of halibut. The IPHC also created several committees that were tasked with developing background information on halibut bycatch in US and Canadian fisheries, programs implemented and under consideration to reduce bycatch, and recommendations for further consideration by the IPHC. Since 2011, a Halibut Bycatch Project Team, composed of IPHC commissioners and Canadian and U.S. agency staff, has been discussing and reviewing the status of halibut bycatch in the North Pacific. The Team is exploring options for reducing and mitigating halibut bycatch. The Team's draft report contains its findings (http://www.iphc.int/research/245-bycatch.html).

Figure 12 Total estimated removals by source in Areas 2C, 3A, and 3B since 1888. Note that the y-axes differ in scale. (Source: IPHC)

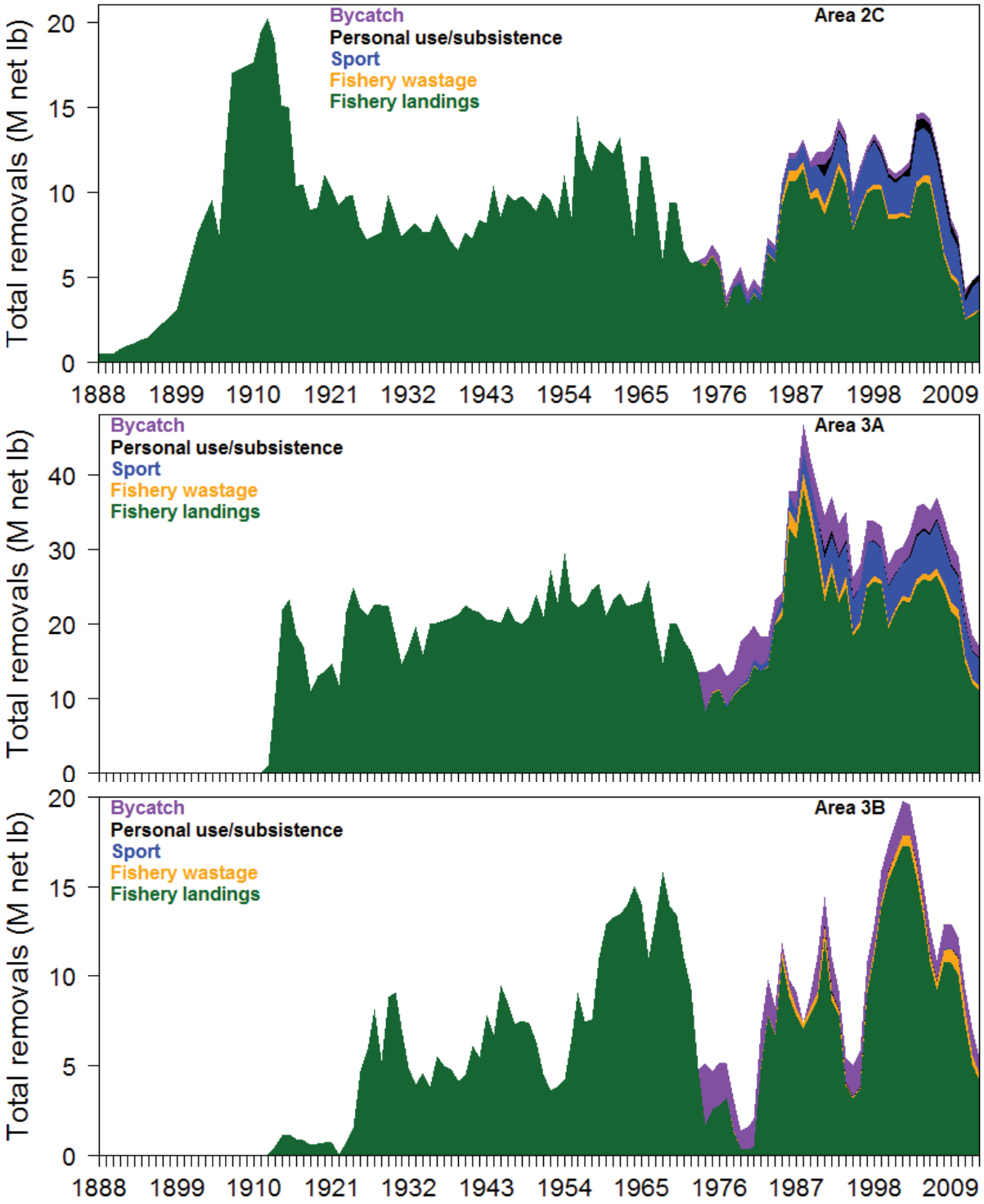
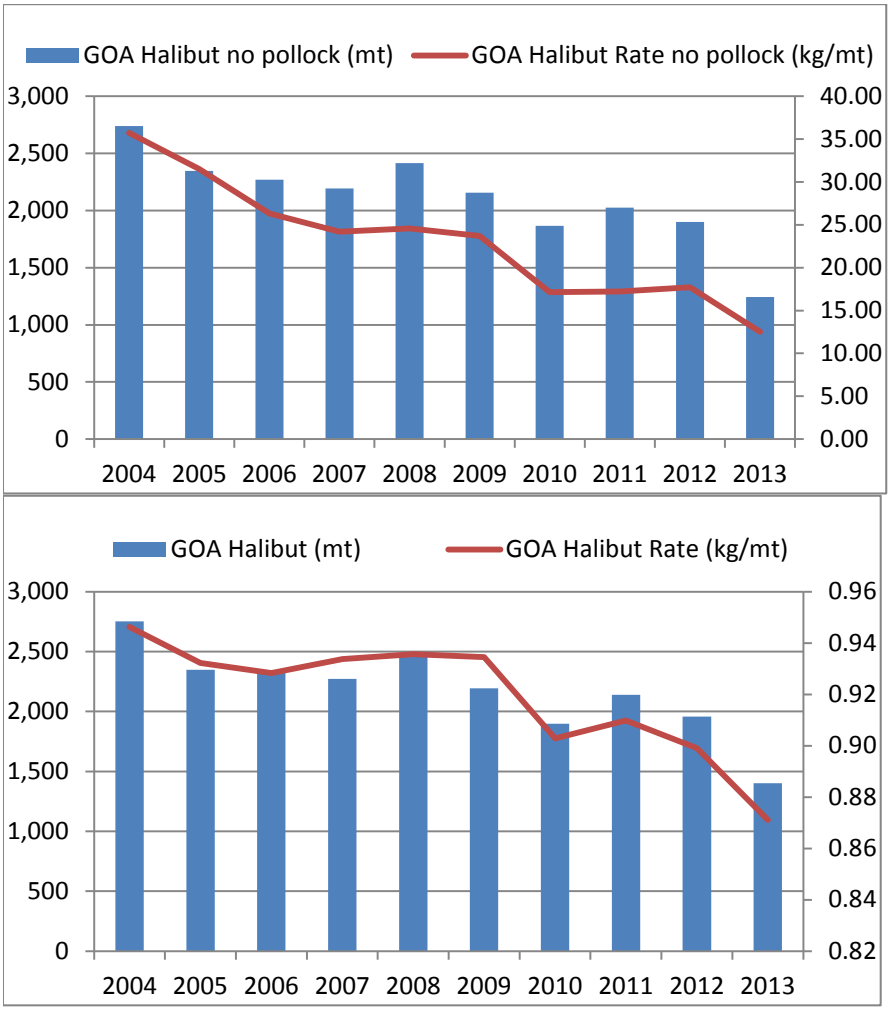


Figure 13 Pacific halibut bycatch in mt (left y-axis) and rates in kg/mt (right y-axis), 2004 through 2013. (Source: NMFS)



3.2.1 Effects of the Alternatives

The effects of the use of current and proposed gear in the halibut IFQ HAL longline fishery are addressed here. The halibut fishery is assessed annually in the Report of Assessment and Research Activities (RARA); the latest edition is cited in this document as IPHC, 2014. Table 3 in Section 3.1.1 described the criteria that are used to determine whether the impacts on the GOA halibut stock are likely to be significant. While NMFS has not established status determination criteria for halibut, the best available information from the IPHC suggests that the halibut stock is neither overfished nor subject to overfishing. GOA biomass levels are projected to decrease in the near future due to a lack of recruitment, and size-at-age (Figure 3). It is estimated that the GOA halibut fishery under the status quo is sustainable.

The sablefish and halibut IFQ fisheries are prosecuted simultaneously and harvests of both fish may be landed together, as long as sufficient IFQ are held by those on board to cover those harvests. Alternative 2, Element 4 (part of the preferred alternative) addresses management of Pacific halibut, which is shared among various agencies: the Council, IPHC, and NMFS. The IPHC is authorized to set catch limits and define gear for halibut, among other responsibilities. Element 4 would allow halibut IFQ to be retained in

addition to sablefish IFQ when using pot longline gear in the GOA. Implementation of Element 4 would require a separate and complementary action by the IPHC to redefine allowable gear for the retention of halibut in the GOA. Both the Council and IPHC have expressed intent that retention of halibut in sablefish pot longline gear, if approved, be limited to incidental amounts and not become a targeted halibut IFQ fishery. Potential management measures to limit halibut IFQ harvest in pot longlines are analyzed in Section 4.9.6.1.

3.2.1.1 Alternative 1: No Action

Maintaining the current prohibition on the use of pot gear (single or longline) in the GOA is the status quo, or No Action, alternative. Continued prohibition on the use of pot longline gear would not change (increase or decrease) the fishing mortality on halibut, as hooked fish would continue to be depredated by whales. These halibut mortalities, which are not legally landed, are considered part of the incidental mortality of Pacific halibut in the sablefish IFQ fishery.

The incidental mortality of halibut due to whale depredation is not explicitly accounted for in stock assessment models because a time series of total annual whale depredation does not exist. The stock assessment model implicitly represents whale depredation losses as a reduction in the overall stock productivity. For example, increasing trends in whale depredation rates would be reflected as decreasing trends in stock productivity. Selecting Alternative 1 would not result in any change from the status quo in regards to halibut biomass available for harvest. Taking no action would not address the Council's stated purpose and need, which is to reduce whale interactions with HAL fishing gear in the GOA.

Without Element 4, all halibut would continue to be discarded if caught with pot longline gear. Such a requirement is in conflict with one of the tenets of the halibut/sablefish IFQ Program, which is to allow fishermen to retain all legal fish of both species if sufficient IFQ are held to cover that harvest.

3.2.1.2 Alternative 2: Preferred Alternative, Element 4

The Council has identified the need to maximize the ability of sablefish QS holders to harvest their sablefish IFQ by increasing catch per unit of effort and reducing fishing costs. The Council has identified marine mammal depredation on halibut in the IFQ fishery as a continuing issue, and one that is difficult to quantify. As part of selecting Alternative 2 as the preferred alternative, the Council is also recommending that legal-size (over 32 inch) halibut be retained if sufficient IFQ are held to cover the harvest (subject to complementary rulemaking by IPHC). The Council considered measures to ensure that halibut retained in the sablefish IFQ fishery are of a level that maintains the incidental nature of the catch. Identification of "incidental" levels of harvest, however, would be difficult. For ease of use in the fishery, public understanding, implementation, and enforcement, the Council's preferred alternative recommends the use of pot longline gear, with no additional limits (other than those general IFQ Program limitations currently in Federal regulations), in order to eliminate the aforementioned inefficiencies associated with whale depredation from HAL longline gear. Such a policy change to the halibut IFQ Program, however, would benefit from greater dialogue with the halibut IFQ fleet and the IPHC, as identification of legal gear for the harvest of halibut also requires amending IPHC regulations. The Council did not identify management measures to limit halibut IFQ retention to *incidental* amounts.

For reference, the Council considered a separate action that would allow retention of halibut in sablefish pots (pot-and-line and pot longline gear) in the parts of the BS and AI sablefish management areas that overlap halibut regulatory Area 4A. The Council considered setting a halibut MRA for that action. The MRA would be intended to prevent the targeting of halibut IFQ using pot gear, although it would likely result in some discards and associated mortality. In April 2015, the Council chose not to pursue further action on halibut retention in sablefish pots in Area 4A.

Analysis of potential DMRs is not necessary or appropriate under this action, as MRA measures are not part of the Council's alternatives or the preferred alternative. The potential for DMRs could be considered, if appropriate and if sufficient data are available, under the triennial DMR report provided to the Council by the IPHC staff, as part of the Groundfish SAFE Reports. The next DMR report is scheduled for Council review in October/December 2015, so that it may adopt DMRs for the groundfish fisheries for 2016 through 2018.

The Council also noted the need to coordinate the timing of implementation of complementary sets of regulations. Both Federal (NMFS) regulations and IPHC (annual management measures) regulations would need to be amended to identify pots as legal gear for halibut.

Gear retrieval and marking requirements are recommended under the preferred alternative (Elements 2 and 3). Some of those requirements were derived from issues thought to be related to halibut mortality in pots that were proposed for consideration through the Council in 2012 and 2013 discussion papers, and recommended by the Sablefish Gear Committee (see items A through D, below) and the Advisory Panel. The following management topics were identified by the Sablefish Gear Committee as being of interest to Element 4.

A. Exacerbation of halibut mortality

The Sablefish Gear Committee discussed whether additional halibut mortality is associated with pot gear. It observed that halibut mortality could be increased due to increased soak times and concluded that the net change in halibut mortality from switching from longline gear to pot longline gear would be difficult to quantify. Halibut bycatch in pots is low, and lower than on hook-and-line gear, based on reports in BSAI sablefish fisheries. The overall effect of switching some fishing effort from hook-and-line gear to pot longline gear may be to reduce halibut mortality, even though those few fish must be discarded.

Sablefish Gear Committee members reported that the pot tunnel size likely will determine how much halibut bycatch occurs. A committee member suggested that halibut bycatch and overall mortality would be less with pot gear. Pots would catch fewer halibut; and even if the halibut mortality may be higher in pots, the overall mortality would be less. If the IPHC allowed pots as legal gear for halibut for those holding halibut IFQ permits, bycatch and halibut mortality would decrease (see discussion of Area 4A halibut pot proposal before the IPHC in January 2014).

The Committee also noted that pots in the BSAI sablefish IFQ fishery use a "sock tunnel". It is very difficult for halibut to push their way through into the pot. One committee member's experience in longlining pots in the Bering Sea sablefish IFQ fishery was that halibut bycatch was minimal, 1 or 2 fish per string. The depth at which pot longline gear is deployed in the Bering Sea avoids halibut concentrations.

B. Shifting predation to halibut

The Sablefish Gear Committee discussed the potential for increased halibut mortality if whale depredation shifted to the hook-and-line halibut FIQ fishery, and concluded that it would be difficult to quantify net changes.

C. Halibut retention in pots

No studies were found comparing catch rates of Pacific halibut in different types of groundfish pots. Williams et al. (1982) compared catch rates of halibut in several types of crab pots. Top-entry crab pots had substantially lower catch rates of halibut than side-entry pots. "Tanner boards," which are placed

horizontally across the upper half of the tunnel opening, reduced the catch rate of halibut by side-entry pots by 63 percent. In addition, the catch of halibut over 90 cm long was almost eliminated. The authors recommended further gear research to determine if side-entry pots can be modified to significantly reduce halibut loss with little cost.

The Sablefish Gear Committee unanimously recommended that the proposed action include adoption of retention of halibut in pot gear by IFQ holders in all halibut management areas. However, the committee recognized that consideration of halibut retention in pots in all areas was beyond the charge to the committee.

D. Spatial distribution of halibut and sablefish harvest in affected area

Figure 14 (percent) and Figure 15 (number) show the distribution oflandings (blocks) in the BSAI of IFQ sablefish and halibut bycatch (vertical bars) caught with pot gear summed over four years (2009-2012). The highest amounts in percent and numbers of both sabelfish and halibut catch appears closest to the port of Dutch Harbor. Appendix 1 shows the relationship between pot landings of sablefish, and halibut bycatch, by month during the IFQ season.

The preferred alternative would allow, but not require, a new gear for use in the GOA sablefish IFQ fishery. However, the incidental amounts of halibut that would be allowed to be retained using pot longline gear in the sablefish IFQ fishery, would be *required* to be retained under Alternative 2, Element 4, if also adopted by the IPHC. The effects of the use of pot longline gear on the halibut stock would be proportionate to its actual use and to the extent that sablefish harvesters possess halibut IFQ, but is expected to be minor. If the pot catch of halibut was sufficiently large, the IPHC would need to determine a pot longline gear selectivity curve for halibut stock assessment in order to properly account for the resulting halibut removals. The reduction in halibut depredation mortality that is saved under the preferred alternative is unknown, but is likely proportionate to the use of pot longline gear *and* the proportion of retainable halibut (over 32 inches) in the catch. The amount of halibut that would have been lost to depredation is assumed to be completely harvested by sablefish IFQ fisheries under the proposed alternative (up to any regulatory limits), but could not exceed the total amount of IFQ derived from QS held by fishery participants. Cumulative harvest of IFQ could not exceed the halibut commercial catch limit.

Figure 14 Number of halibut as a percent of total (summed over 2009-2012) halibut caught incidentally in IFQ sablefish fishery in pot gear. (Source: NMFS AKRO)

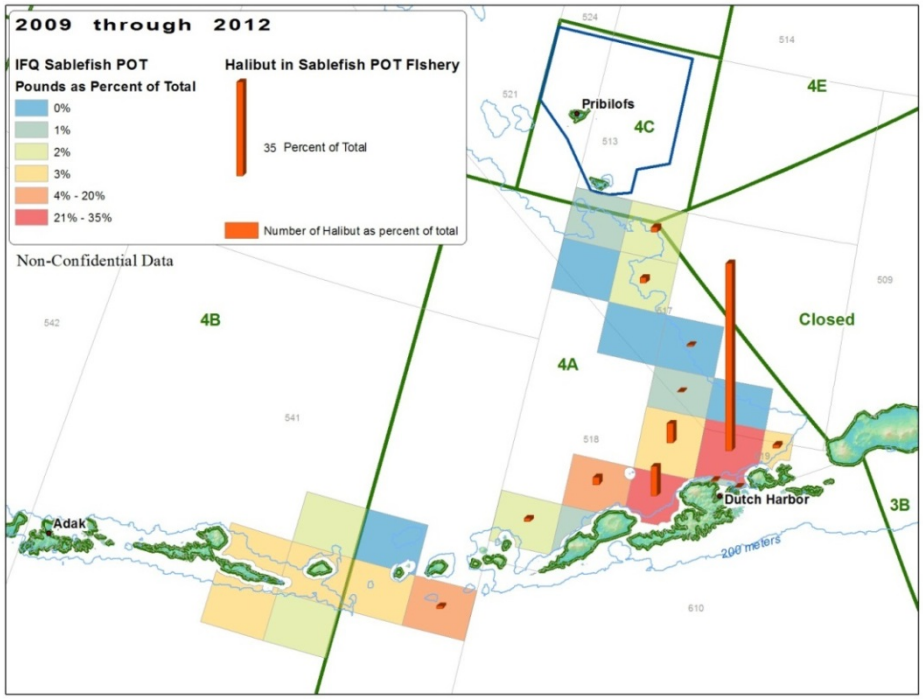
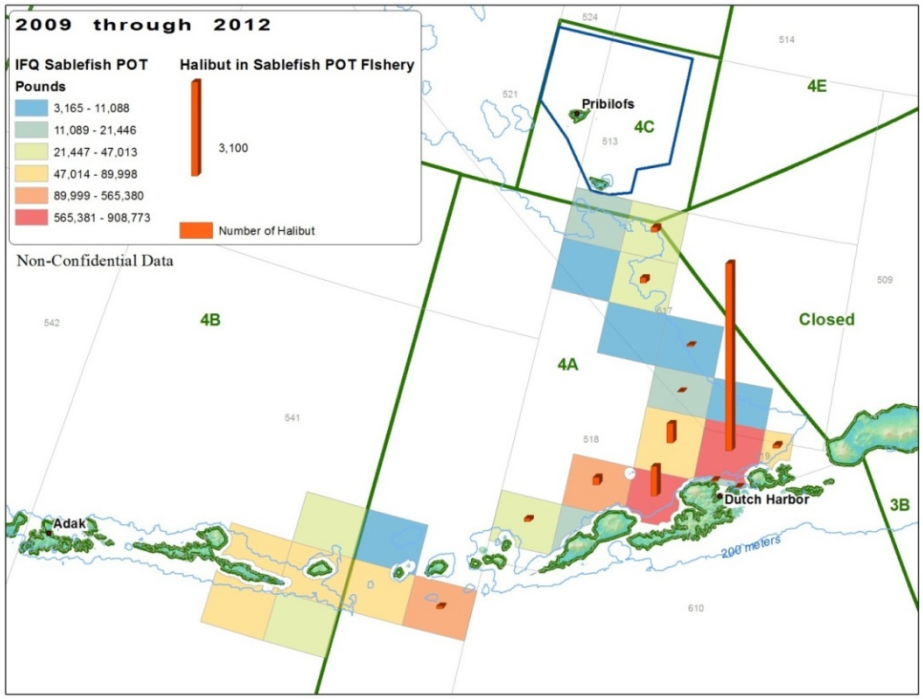


Figure 15 Number of total halibut (summed over 2009-2012) caught incidentally in IFQ sablefish fishery in pot gear. (Source: NMFS AKRO)

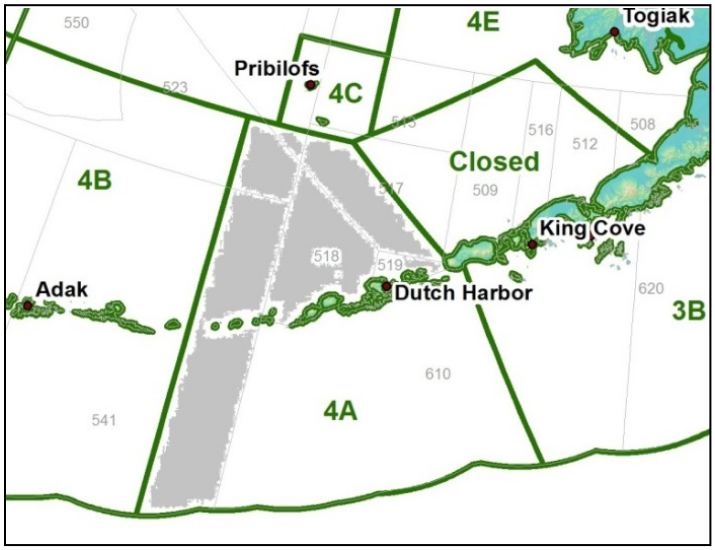


Area 4A action

In the halibut retention action referenced above, the Council had recommended that the IPHC allow incidental retention of halibut IFQ in pot gear in halibut regulatory Area 4A. In April 2013 the Council recommended that the IPHC amend its regulations to allow the retention of Area 4A halibut IFQ that are incidentally caught while targeting sablefish IFQ and CDQ using pot gear in the area of overlap with the BSAI, if the harvester holds both halibut and sablefish IFQ. Area 4A overlays Area 610, the WGOA, Area 541 (AI) and multiple BS areas (Figure 16). The Council based its recommendation for Area 4A on a March 2013 discussion paper and a revised table on the amount of halibut caught in pots in the affected area.[12] As noted above, the Council chose not to continue analyzing halibut retention in pot gear in Area 4A during its April 2015 meeting.

[12] These are posted at: http://www.npfmc.org/wp-content/PDFdocuments/halibut/4AhalibutPots_ExpanDP-413.pdf, and http://www.npfmc.org/wp-content/PDFdocuments/halibut/4AhalibutPots_Table1.pdf, respectively.

Figure 16 Area of overlap between Pacific halibut regulatory area 4A and Bering Sea and Aleutian Island sablefish management areas



For reference, Table 5 lists the number of halibut retained in pot gear in the area of overlap of Area 4A and the sablefish BS and AI regulatory areas. No comparisons may be drawn from this data for the GOA. Nevertheless, for the area described in Table 5, the highest incidence of halibut in pots occurs in May. Together, April through July accounts for roughly 92 percent of incidental halibut catch in pots.

Table 5 Halibut PSC (number of fish) and pounds of sablefish harvested with pot gear in the parts of the BS and AI sablefish management areas overlapping halibut regulatory Area 4A, cumulative monthly data for 2009 through 2013

Month	Sablefish (round lbs.)	Halibut (# fish)	Percent Total Sablefish (based on lbs.)	Percent Total Halibut (based on numbers)
March	246,978	290	4.82%	1.99%
April	808,629	1,955	15.80%	13.43%
May	883,575	8,435	17.26%	57.95%
June	575,781	1,874	11.25%	12.87%
July	486,874	1,148	9.51%	7.89%
August	401,054	100	7.83%	0.69%
September	655,948	320	12.81%	2.20%
October	766,974	298	14.98%	2.05%
November	293,462	136	5.73%	0.93%
Total	5,119,275	14,556		

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

Conclusions:

The impacts identified for halibut will depend on the magnitude of sablefish IFQ effort that is switched from HAL longline to pot longline gear. If the magnitude of gear switching is sufficiently high, data for a stock assessment selection curve would be needed to estimate the impact of the removals. If whale depredation is reduced, some (unquantified) benefit would occur. However, whale depredation of halibut is currently accounted for as part of natural mortality with the halibut assessment. Halibut discard

mortality would continue to occur for those halibut not allowed to be retained. This mortality would accrue from two scenarios: (1) when no halibut under the 32 inch size limit may be retained in pot longline gear; and (2) when halibut in excess of possible regulatory limits would be imposed to keep halibut retention at incidental amounts, and not part of a directed fishery.

3.3 Other Fish Species

Groundfish species that are managed under the GOA Groundfish FMP and caught incidentally in the GOA sablefish hook-and-line fishery are listed in Table 6. None of these species are either overfished or experiencing overfishing. Further information on these groundfish species and, for some, their directed fisheries can be found in the most recent GOA Groundfish SAFE Report (NPFMC, 2014). Catch of non-target species and prohibited species in the GOA sablefish fishery is described in Section 4.5.4.2, with the primary species of interaction being grenadier.

Table 6 Bycatch of FMP groundfish species in the GOA sablefish hook-and-line fishery, cumulative from 2008 through 2013

Species Name	Retained (mt)	Discarded (mt)
GOA Thornyhead Rockfish	2,040	793
GOA Shortraker Rockfish	574	717
GOA Rougheye Rockfish	487	298
Pacific Cod	263	277
Arrowtooth Flounder	161	1,105
GOA Demersal Shelf Rockfish	63	3
Other Rockfish	59	137
GOA Skate, Longnose	38	778
GOA Skate, Other	29	795
GOA Shallow Water Flatfish	6	18
GOA Skate, Big	5	28
GOA Pelagic Shelf Rockfish	2	7
Pollock	1	9
GOA Deep Water Flatfish	1	46
GOA Dusky Rockfish	1	1
Shark	1	1,651
Other Species	< 1	289
Octopus	< 1	15
Pacific Ocean Perch	< 1	3
Northern Rockfish	< 1	< 1
Squid		< 1
Sculpin		47
GOA Rex Sole		< 1
Atka Mackerel		< 1
Flathead Sole		4

"Other Species" includes different shark, squid, and sculpin species that are not captured in other AKFIN species groupings.
Source: NMFS AKRO Blend/Catch Accounting System via AKFIN.

3.3.1 Effects of the Alternatives

The effects of the use of current and proposed gear in the sablefish IFQ fishery are addressed here. The GOA groundfish stocks are assessed in the GOA Groundfish SAFE report (NPFMC 2014), and are also evaluated in the Alaska Groundfish Fisheries Harvest Specifications EIS (NMFS 2007a). Table 3 describes the criteria used to determine whether the impacts of this action on the GOA FMP groundfish stocks are likely to be significant.

3.3.1.1 Alternative 1: No Action

Maintaining the current prohibition of the use of pot (single or longline) gear in the GOA sablefish IFQ fishery would continue the prohibition on the use of pot gear and would not change (increase or decrease) the fishing mortality on other fish species, as hooked fish would continue to be predated upon by whales, retained as bycatch, or discarded. These mortalities are accounted for in the management of the species under the GOA Groundfish FMP, which is designed to prevent negative effects to groundfish stocks. Total catch of targeted groundfish is managed to prevent exceeding ABCs.

3.3.1.2 Alternative 2: Preferred Alternative

Allowing the use of pot longline gear in the GOA sablefish IFQ fishery could decrease the overall amount of HAL effort, replacing it with pot longline gear. Based on historical bycatch amounts for GOA sablefish HAL fishing (Table 6) and for GOA Pacific cod pot fishing (Table 23, in Section 4.5.4.2 of the RIR), shifting to pot longline gear could marginally reduce the bycatch of skates, sharks, rockfish, and sculpins, while potentially increasing the bycatch of octopus and crab. In BSAI pot fisheries for sablefish, the most common bycatch species was arrowtooth flounder. Though unquantified in this report, reducing the amount of whale prey species caught on HAL gear could alter the feeding habits of whales and could increase predation on species that are more easily accessible when not caught on fishing gear. Similarly, whale depredation could shift to remaining longline gear in the GOA, thereby increasing depredation of HAL bycatch species from what gear remains.

Allowing the use of longline pot gear would be expected to reduce bycatch of fish species that are commonly taken with HAL gear, but encountered less often with pot gear. The preferred alternative likely would reduce bycatch for rockfish, sharks, skates and other groundfish species commonly caught as bycatch by vessels using HAL gear in the GOA sablefish IFQ fishery. Bycatch of some species (e.g., octopus) is higher for pot gear than HAL gear, but that overall bycatch of groundfish species would be expected to be lower by vessels using longline pot gear. The amount of bycatch reduction cannot be quantified because it would depend on the number of vessels and the amount of sablefish IFQ that is voluntarily fished by vessels using HAL gear relative to longline pot gear. However, reducing bycatch would be expected to have some benefits for participants in fisheries that target these species. In addition, reducing bycatch of non-target species would increase harvesting efficiency and reduce operating costs because sablefish fishermen would increase sablefish catch per unit of effort.

3.4 Marine Mammals

Alaska supports one of the richest assemblages of marine mammals in the world. Twenty-two species are present from the orders Pinnipedia (seals and sea lions), Carnivora (sea otters), and Cetacea (whales, dolphins, and porpoises). Some marine mammal species are resident throughout the year, while others migrate into or out of Alaska fisheries management areas. Marine mammals occur in diverse habitats, including deep oceanic waters, the continental slope, and the continental shelf (Lowry et al. 1982).

Fishing may affect marine mammals through direct and indirect pathways. Direct effects of fishing on marine mammals include entanglement or incidental catch of marine mammals in fishing gear, marine mammal disturbance due to vessel noise, and ship strikes. As well, fisheries may affect marine mammal prey and affect marine mammals indirectly. Marine mammals—killer whales and sperm whales, in particular—may affect the sablefish longline fishery by depredating sablefish from the line. These latter interactions reduce the efficiency of the fishery and increase the likelihood of entanglement of these whales in fishing gear.

The BSAI and GOA groundfish FMPs contain numerous measures to protect marine mammals from effects of fishing and prioritize research and monitoring to further define the nature and extent of fishery impacts on these species. Marine mammal byacth data from the Alaska groundfish fisheries from 1998-2004 is provided in a 2006 NOAA Technical Memorandum (Perez et al., 2006). Perez et al. (2006) also describe the nature of marine mammal bycatch in the fisheries, the methods used to document marine mammal interactions with fishing gear and the methods used to extrapolate the fishery observer data to the entire fisheries. The most recent marine mammal stock status and fishery interaction information for Alaska is available in the 2015 Marine Mammal Stock Assessment Reports (SARs) (Muto et al., 2016). A table listing marine mammal species and their status, fishing mortality, subsistence mortality, and total mortality is in the Summary Table of the SAR available at

http://www.nmfs.noaa.gov/pr/sars/pdf/ak2015_summary_final.pdf. Note that the fishing mortality in the Summary Table includes all fishing mortality, including interactions in Federal and State of Alaska fisheries.

Marine mammals, including those listed as endangered or threatened under the ESA, that may be present in the action area are listed in Table 7. These species are managed by NMFS, with the exception of Pacific walrus, polar bears, and Northern sea otters, which are managed by USFWS.

NMFS has completed ESA section 7 consultations for the Federal BSAI and GOA groundfish fisheries for all ESA-listed species. The last programmatic ESA section 7 consultation on the effects of the groundfish fisheries, as authorized by the GOA groundfish FMP, was initiated in 2006 (NMFS 2006a) and completed in 2010 (NMFS 2010a). On June 21, 2006, NMFS Alaska Region Protected Resources Division concluded that the groundfish fisheries were not likely to adversely affect the following listed marine mammal species or designated critical habitat: blue whale, right whale or designated right whale critical habitat, sei whale, or fin whale (NMFS 2006a). NMFS Alaska Region Protected Resources Division concluded that the BSAI and GOA groundfish fisheries were likely to adversely affect Steller sea lions and designated critical habitat, humpback whales, and sperm whales (NMFS 2006a). Subsequent to reinitiation of consultation, NMFS included fin whales in the formal ESA section 7 consultation which culminated with the release of a biological opinion in 2010 (NMFS 2010). NMFS designated critical habitat for the North Pacific right whale on April 8, 2008 (73 FR 19000) and concluded on April 30, 2008 (NMFS 2008) that the findings (that the fisheries were not likely to adversely affect the right whale or critical habitat) in the 2006 Biological Assessment (NMFS 2006b) and memorandum (NMFS 2006a) were unchanged.

The 2010 biological opinion (NMFS 2010) concluded that the BSAI and GOA groundfish fisheries were not likely to jeopardize the continued existence of the eastern DPS of Steller sea lion, the humpack whale, the sperm whale or the fin whale. The 2010 biological opinion concluded that NMFS could not insure that the BSAI and GOA groundfish fisheries were not likely to jeopardize the continued existence of the western DPS of Steller sea lions (Steller sea lion WDPS) or adversely modify its designated critical habitat. Additional protection measures to conserve prey for Steller sea lions in the western and central Aleutian Islands and insure that the fisheries were not likely to jeopardize the continued existence of the Steller sea lion WDPS or adversely modify its designated critical habitat were implemented in the fisheries in 2011 (76 FR 2027, January 12, 2011) and amended again in 2015 (79 FR 70286, November 25, 2014) following the completion of a biological opinion on the 2015 measures (NMFS 2014b).

NMFS listed the Cook Inlet beluga whale as endangered under the ESA on October 22, 2008. NMFS SFD and PRD consulted on the effects of the BSAI and GOA groundfish fisheries on the Cook Inlet beluga whale in 2010. In March, 2010 NMFS PRD determined that the groundfish fisheries were not likely to adversely affect Cook Inlet beluga whales. On April 11, 2011 NMFS designated critical habitat for the Cook Inlet beluga whale. NMFS SFD and PRD consulted on the effects of the BSAI and GOA groundfish fisheries on designated critical habitat for the Cook Inlet beluga whale in 2012. In February, 2012 NMFS PRD determined that the BSAI and GOA groundfish fisheries were not likely to adversely affect Cook Inlet beluga whale designated critical habitat.

The USFWS listed the southwest Alaska DPS of the northern sea otter (northern sea otter SWDPS) as threatened under the ESA in 2005. In 2006, NMFS and the USFWS consulted on the effects of the BSAI and GOA groundfish fisheries on the northern sea otter SWDPS. The consultation concluded with a determination that the fisheries were not likely to adversely affect the northern sea otter SWDPS. The USFWS designated critical habitat of the northern sea otter SWDPS in 2009. In 2013, NMFS and the USFWS consulted on the effects of the BSAI and GOA groundfish fisheries on the northern sea otter

SWDPS. In July, 2013 the USFWS determined that the BSAI and GOA groundfish fisheries were not likely to adversely affect the northern sea otter SWDPS or designated critical habitat.

Section 7 of the ESA requires agencies to reinitiate formal ESA section 7 consultation if the amount or extent of incidental take is exceeded, new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered, the action is modified in a manner causing new effects to listed species or critical habitat not previously considered or if a new species is listed or critical habitat designated that may be affected by the action.

Table 7 Marine mammals likely to occur in the Gulf of Alaska

	Species	Stocks
Pinnipedia	Steller sea lion*	Western U.S (west of 144E W long.)* and Eastern U.S. (east of 144E W long.)
	Northern fur seal**	Eastern Pacific
	Harbor seal	Southeast Alaska, Gulf of Alaska, Bering Sea
	Ribbon seal	Alaska
	Northern elephant seal	California
Cetacea	Beluga Whale*	Cook Inlet
	Killer whale**	Eastern North Pacific Northern Resident, Eastern North Pacific Alaska Resident, Eastern North Pacific GOA, Aleutian Islands, and Bering Sea transient, AT1 transient**, West Coast Transient
	Pacific White-sided dolphin	North Pacific
	Harbor porpoise	Southeast Alaska, Gulf of Alaska, and Bering Sea
	Dall's porpoise	Alaska
	Sperm whale*	North Pacific
	Baird's beaked whale	Alaska
	Cuvier's beaked whale	Alaska
	Stejneger's beaked whale	Alaska
	Gray whale	Eastern North Pacific
	Humpback whale	Western North Pacific*, Central North Pacific
	Fin whale*	Northeast Pacific
	Minke whale	Alaska
	North Pacific right whale*	North Pacific
	Blue whale*	North Pacific
	Sei whale*	North Pacific
Mustelidae	Northern sea otter*	Southeast Alaska, Southcentral Alaska, Southwest Alaska*

*ESA-listed species; **Listed as depleted under the MMPA

The PSEIS (NMFS 2004) provides descriptions of the range, habitat, and diet for marine mammals. SARs are prepared annually for the strategic marine mammal stocks (Steller sea lions, northern fur seals, harbor porpoise, North Pacific right whales, humpback whales, sperm whales, and fin whales)[13]. The SARs (Muto et al., 2016) provide population estimates, population trends, and estimates of the potential biological removal (PBR) levels for each stock. The SARs also identify potential causes of mortality and whether the stock is considered a strategic stock under the MMPA. The information from the PSEIS and the SARs is incorporated by reference.

Direct and indirect interactions between marine mammals and groundfish fishing vessels may occur due to overlap in the size and species of groundfish harvested in the fisheries that are also important marine mammal prey, and due to temporal and spatial overlap in marine mammal occurrence and commercial fishing activities. This discussion focuses on marine mammals that be affected by fishing gear currently being used and proposed to be used in the sablefish IFQ fishery in the GOA— North Pacific right whales, humpback whales, sperm whales and killer whales, which are known to predate on fish caught in the sablefish IFQ fishery (Table 8).

[13]The SARs are available on the NMFS Protected Resources Division website at http://www.nmfs.noaa.gov/pr/sars/region.htm.

Table 8 Status of Cetacea stocks potentially affected by the action

Cetacea species and stock	Status under the ESA	Status under the MMPA	Population trends	Distribution in action area
Killer whale – AT1 Transient, E N Pacific transient, W Coast transient, Alaska resident	Southern resident endangered; remaining stocks none	AT1 depleted and a strategic stock, Southern Resident depleted. The rest of the stocks: None	Southern residents have declined by more than half since 1960s and 1970s. Unknown abundance for the Alaska resident; and Eastern North Pacific GOA, Aleutian Islands, and Bering Sea transient stocks. The minimum abundance estimate for the Eastern North Pacific Alaska Resident stock is likely underestimated because researchers continue to encounter new whales in the Alaskan waters.	Transient-type killer whales from the GOA, Aleutian Islands, and Bering Sea are considered to be part of a single population.
Sperm whale North Pacific	Endangered	Depleted & a strategic stock	Abundance and population trends in Alaska waters are unknown.	Inhabit waters 600 m or more depth, south of 62°N lat. Widely distributed in North Pacific. Found year-round In GOA.
Humpback whale — Western and Central North Pacific[a]	W North Pacific DPS – Endangered Hawaii DPS-recovered, Mexico DPS – threatened	Depleted & a strategic stock	Increasing. The Structure of Populations, Levels of Abundance, and Status of Humpbacks (SPLASH) abundance estimate for the North Pacific represents an annual increase of 4.9% since 1991–1993. SPLASH abundance estimates for Hawaii show annual increases of 5.5% to 6.0% since 1991–1993 (Calambokidis et al. 2008).	MMPA stocks: W. Pacific and C. North Pacific stocks occur in GOA waters and may mingle in the North Pacific feeding area. ESA stocks: W. North Pacific DPS
North Pacific right whale Eastern North Pacific	Endangered	Depleted & a strategic stock	This stock is considered to represent only a small fraction of its precommercial whaling abundance and is arguably the most endangered stock of large whales in the world. A reliable estimate of trend in abundance is currently not available.	Before commercial whaling on right whales, concentrations were found in the GOA, eastern Aleutian Islands, south-Central Bering Sea, Sea of Okhotsk, and Sea of Japan (Braham and Rice 1984). During 1965–1999, following large illegal catches by the U.S.S.R., there were only 82 sightings of right whales in the entire eastern North Pacific, with the majority of these occurring in the Bering Sea and adjacent areas of the Aleutian Islands (Brownell et al. 2001). Critical habitat near Kodiak Island in the GOA

Sources: Muto et al. 2016; List of Fisheries for 2016 (81 FR 20550, April 8, 2016); https://www.federalregister.gov/documents/2016/04/08/2016-08114/list-of-fisheries-for-2016. North Pacific right whale included based on NMFS (2006a) and Salveson (2008). AT1 Killer Whales information based on 69 FR 31321, June 3, 2004. North Pacific Right Whale critical habitat information: 73 FR 19000, April 8, 2008.

[a] On September 8, 2016, NMFS published a final decision changing the status of humpback whales under the ESA (81 FR 62259). In the 2016 decision, NMFS recognized the existence of 14 DPSs, classified four of those as endangered and one as threatened, and determined that the remaining nine DPSs do not warrant protection under the ESA. Three DPSs of humpback whales occur in waters off the coast of Alaska: the WNP DPS, which is an endangered species under the ESA, the Mexico DPS, which is a threatened species, and Hawaii DPS, which is not protected under the ESA. Whales from these three DPSs overlap to some extent on feeding grounds off Alaska.

3.4.1 Effects on Marine Mammals

3.4.1.1 Alternative 1: No Action

Maintaining the current prohibition of the use of pot (single or longline) gear in the GOA is the status quo, or No Action, alternative. Continued use of currently allowed gear would not address the purpose and need for the action, which stresses the need to:

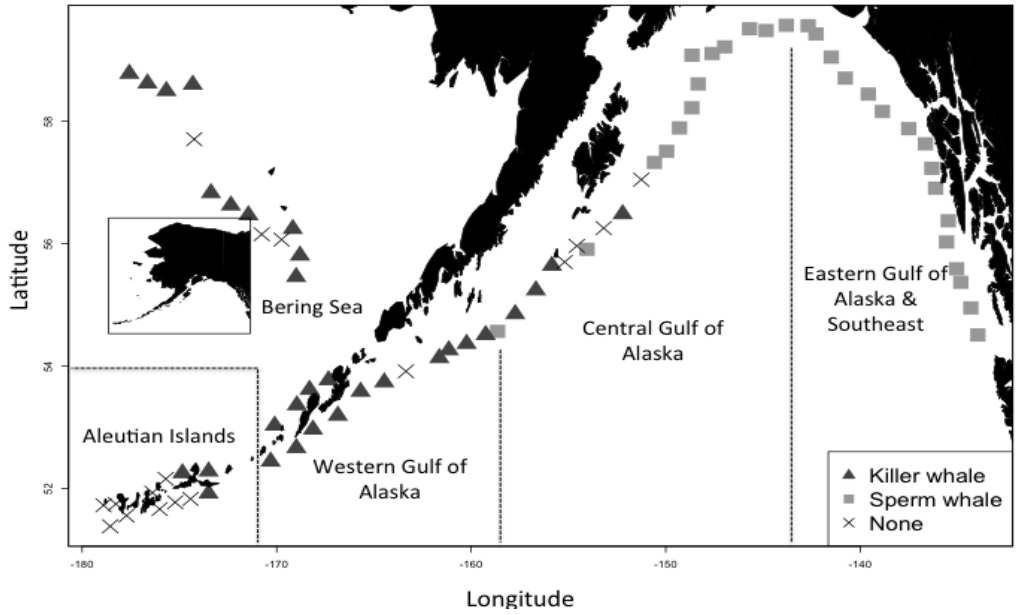
1. Minimize fishery interactions with sperm whales in the CGOA and EGOA, and killer whales in the WGOA, and
2. Maximize the ability of sablefish quota share holders to harvest their sablefish IFQ by increasing catch per unit of effort and reducing fishing costs.

3.4.1.1.1 Killer whales and Sperm whales

The following describes the current state of knowledge on interactions between the sablefish IFQ fishery in the GOA with killer whales and sperm whales.

Depredation by killer whales and sperm whales is common in the Alaska sablefish IFQ fishery (Sigler et al. 2008, Peterson et al. 2013). Killer whale depredation generally occurs in the BS, AI, and WGOA, whereas sperm whale depredation tends to be more problematic in the CGOA and EGOA through Southeast Alaska (Figure 6). In October 2006, fishermen and scientists from around the world, including sablefish fishermen and scientists from Alaska, participated in a depredation workshop focused on mitigating the effects of depredation. Workshop abstracts and summaries are available at: http://depredation.org. A second international depredation and bycatch mitigation workshop was held at the Woods Hole Oceanographic Institution in October 2013 (abstracts available at http://www.bycatch.org/node/796).

Figure 17. Whale 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).



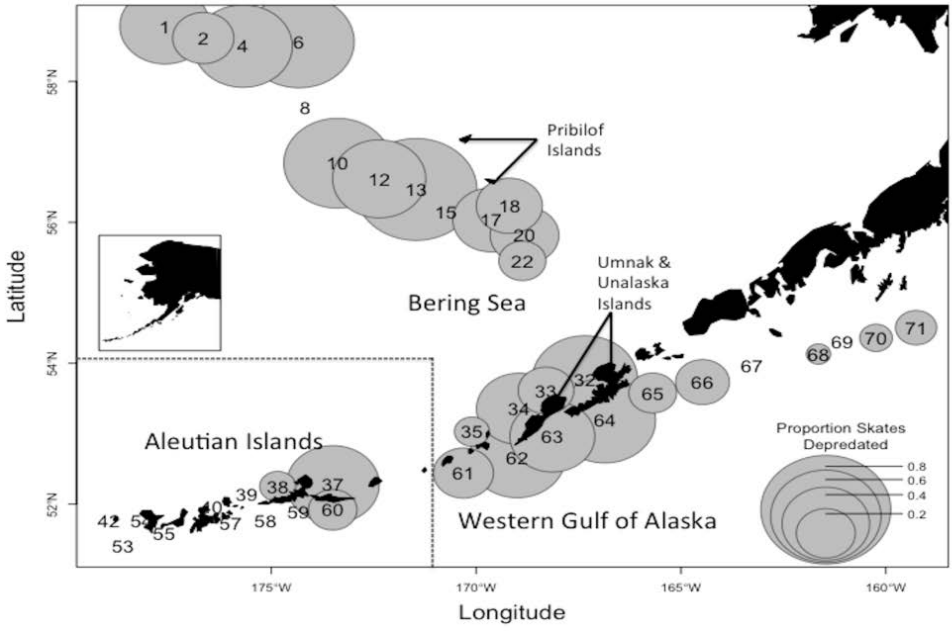
Killer whale depredation is problematic in Western Alaska, where high-value longline fisheries overlap with regions supporting some of the greatest densities of "fish-eating" or resident killer whales in the

world (Forney and Wade 2006, Fearnbach 2012). It was estimated in 2010 that a minimum of 1,300 resident killer whales inhabit the BSAI and WGOA (Angliss and Outlaw, 2010). However, more recent photographic mark-recapture assessments indicate that significantly more (perhaps twice this number) fish-eating residents may use the coastal waters around the Eastern and Central Aleutian Islands alone in some years (Fearnbach 2012). Although diet data is limited in the region, Alaskan resident killer whales have been observed feeding on Pacific salmon, Atka mackerel and Pacific halibut (Ford et al. 1998, Herman et al. 2005, Krahn et al. 2007, Fearnbach et. 2012, Peterson et al. 2013). 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, although longer movements are documented (Ford and Ellis 2006, Forney and Wade 2006, Matkin et al. 2007, Fearnbach, 2012).

Killer whale depredation on the longline survey

Killer whales depredate a number of groundfish species caught on longline gear in Western Alaska including: sablefish, Greenland turbot, arrowtooth flounder and Pacific halibut (Yano and Dalheim 1995, Peterson et al. 2013). Peterson et al. (2013) 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 (Figure 7). 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 (BS only) 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. The frequency of killer whale interactions remained fairly stable in the BS while increasing in the AI and WGOA during the study period (Peterson et al. 2013).

Figure 18 Stations surveyed (numbered 1-71) in the Bering Sea, Aleutian Islands and Western Gulf of Alaska, NMFS longline survey 1998-2011. Symbol sizes (grey circles) are equivalent to the average proportion of skates (string of 45 hooks) depredated by killer whales at each station (Peterson et al. 2013).



Killer whale depredation on the commercial fishery

In a follow-up study, Peterson et al. (2014) extended the analyses discussed above to evaluate the impacts of killer whale depredation on commercial HAL longline fisheries in Western Alaska. This study

synthesized 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 reductions associated with depredating killer whales ranged from 55 to 69 percent (Peterson et al. 2014).

In direct response to depressed CPUEs associated with killer whale depredation, affected commercial longline fishermen reportedly react in two primary ways: (1) dropping their gear back down to "wait the whales out," or (2) moving to a different fishing site to avoid the whales (Peterson and Carothers 2013). Both of these depredation avoidance measures result in reduced fishing 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 steaming in excess of 25 nm 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 killer whale depredated sets was estimated to be approximately $433 (± $147) per set for additional fuel alone (not including additional crew, bait or opportunity costs; Peterson et al. 2014).

Based on NMFS survey data, NMFS observer data and fishermen accounts, killer whale depredation is most severe in the BS. Killer whale depredation in the WGOA may be a more recent issue and is less consistent (Peterson et al. 2013). Despite low interaction rates for the observed fleet in the WGOA, fishermen accounts and NMFS longline survey data suggest that killer whale depredation on sablefish longline fisheries in the WGOA is problematic and may be getting worse (Peterson et al. 2013, Peterson and Carothers, 2013). Based on 70 semi-directed interviews and 95 written surveys conducted with longline fishermen in Alaska, fishermen's perspective on legalizing pot fishing gear for sablefish in the GOA were varied. Written survey respondents were asked if the switch to pot fishing gear was an option for their vessel. Answers were mixed and varied by region fished and vessel category. Generally, 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 (Peterson and Carothers, 2013).

Sperm Whales

Sperm whale depredation affects longline catches in the GOA. Data on sperm whale depredation of longline survey catches have been collected since 1998 (Figure 8). Apparent sperm whale depredation is defined as sperm whales being present with the occurrence of damaged sablefish. While it is difficult to estimate the loss of fish due to depredation, estimates are generally conservative because it is not possible to attribute an empty hook (bait removed or disintegrated) to depredation. Additionally it can be difficult to distinguish whether other species, such as sharks or killer whales, have contributed to the damage or loss of hooked fish. Damage and loss of fish has significant economic and management implications for both fisherman and fishery biologists tasked with assessing fish stocks. In general, depredation by sperm whales seems to be low to moderate, but it is highly variable in extent both among and within fishing areas. The frequency of sperm whales present during fishing operations varies widely from 0 to 100 percent. Illustrative estimates include 16 percent of sampling days during the annual sablefish longline survey in the GOA (Lunsford et al. 2006); 39 percent of longline fishery hauls near Sitka (Straley et al.

2006). Information on the timing and movement patterns of sperm whales may provide a means for fishermen to avoid fishing at whale hot spots, potentially reducing interactions between whales and fishermen (Straley et al. 2014).

Sperm whale depredation on the longline survey

Between 1998 and 2012, sperm whale depredation on GOA longline survey stations occurred on approximately 7 percent to 35 percent of sets ($\bar{x}$=16.8 percent; Figure 8). The percentage of sets impacted by sperm whale depredation was greatest in WY in most years (38 percent), followed by Southeast Alaska (28 percent) and the CGOA (8 percent; Figure 9). In the 2002 SAFE Report, an analysis using longline survey data from 1998 through 2001 found that sablefish catches were significantly less at stations affected by sperm whale depredation. This work was repeated in 2006 using additional data from 2002 through 2004 which were analyzed by fitting the data with a general linear model (Sigler et al. 2008). Neither sperm whale presence nor depredation rate increased significantly from 1998 to 2004. Catch rates were about 2 percent less at locations where depredation occurred, but the effect was not significant. Sigler (2008) reported a 5 percent lower catch rate in sets with depredation evidence in a comparison of all sets with sperm whales present from 1999 to 2001.

Longline survey catch rates are not adjusted for sperm whale depredation because it is not known when measureable depredation began during the survey time series, and because studies of depredation on the longline survey showed no significant effect (Sigler et al. 2008). Current abundance is unbiased if depredation has consistently occurred over time. If significant depredation began recently, then current biomass is underestimated because the relationship between the survey index and biomass has changed. However, if recent catch rates are adjusted for sperm whale depredation when in fact it has happened all along, then current biomass will be overestimated.

Figure 19 Sperm whale depredation on Gulf of Alaska stations, NMFS longline survey 1998-2012

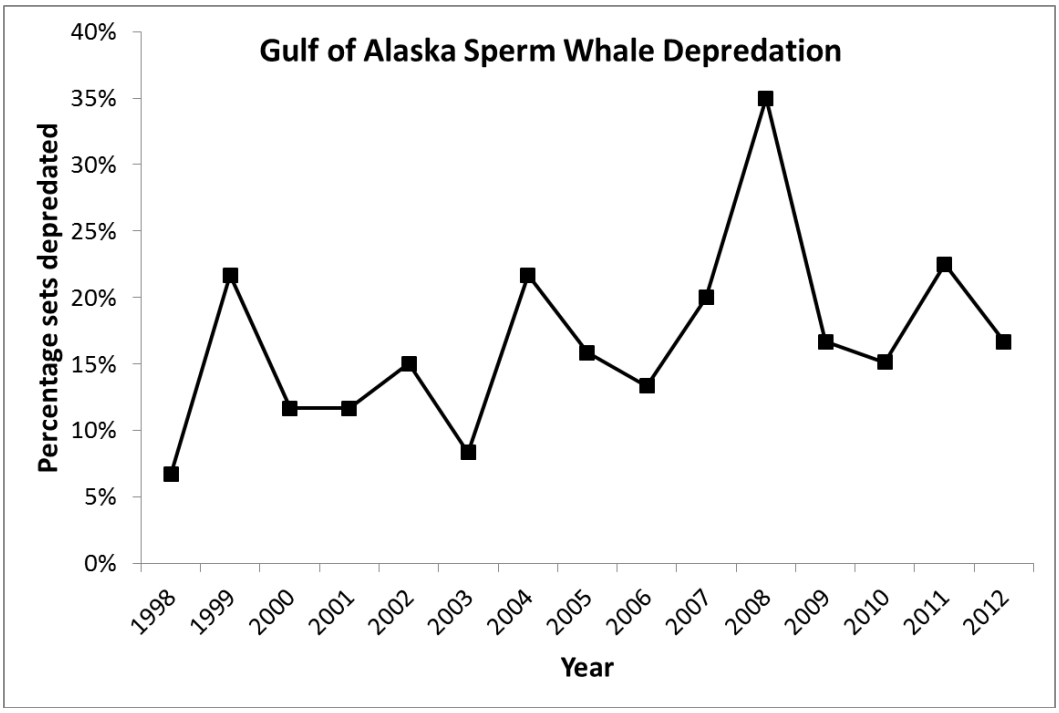
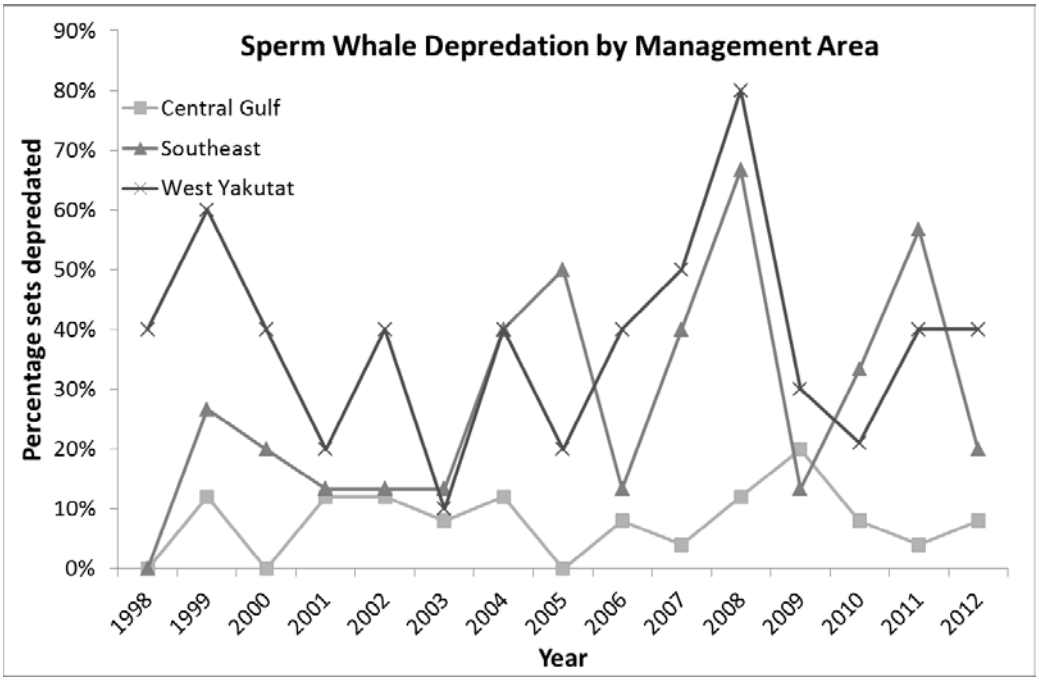


Figure 20 Sperm whale depredation in the Central Gulf of Alaska, West Yakutat and Southeast Alaska management areas, NMFS longline survey 1998-2012

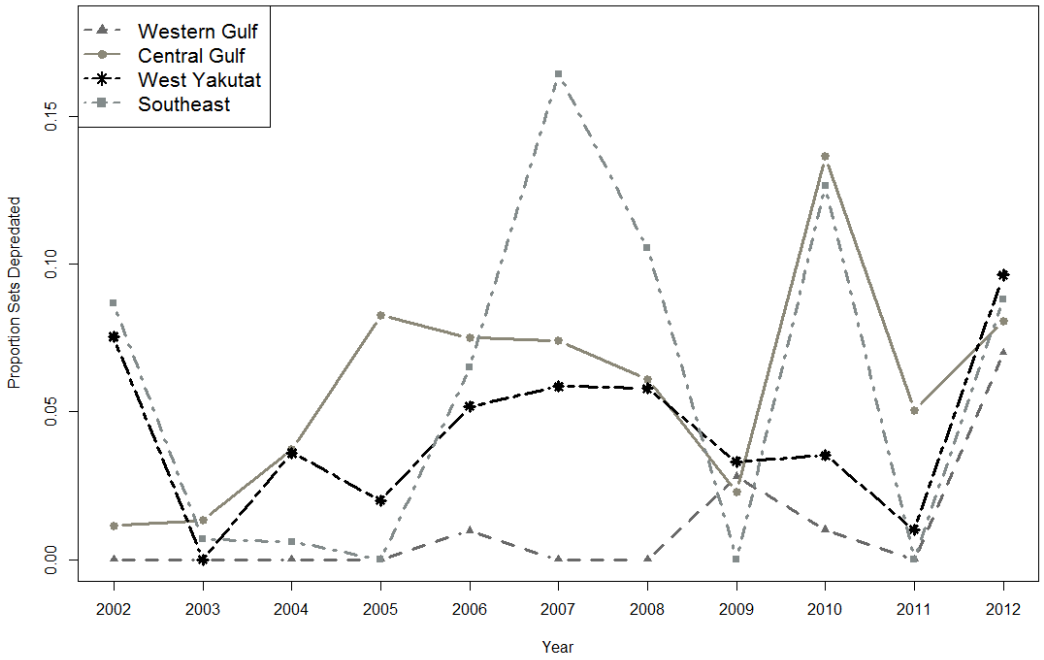


Sperm whale depredation on the commercial hook-and-line longline fishery

An early study using data collected by fisheries observers in Alaskan waters found no significant effect on catch (Hill et al. 1999). Another study using data collected in Southeast Alaska, found a small, insignificant effect comparing longline fishery catches between sets with sperm whales present and sets with sperm whales absent (3 percent reduction, Straley et al. 2005). The rate of depredation, quantified in varying ways, also fluctuates widely. Examples include 0.6 percent of annual sablefish catch for Alaska and catch is reduced by 1.8 percent when depredation occurs (Sigler et al. 2008, Lunsford et al. 2006) and 3 percent of catch in the Sitka fishing grounds, which extends approximately from Dixon Entrance to Cape Ommaney (Straley et al. 2006). Perez et al. (2006) estimated that marine mammal depredation on the combined longline fisheries in Alaska caused a loss of about 2.2 percent of the total fishery groundfish catch during 1998 through 2004, based on visual evidence of torn or partial fish.

Sperm whale sightings were also noted in some logbooks and observer data, however sperm whale presence does not imply depredation and when depredation occurs it is often minimal and difficult to quantify in comparison to killer whale depredation. Therefore, sperm whale depredated sets are not excluded from observer data or logbook data. A preliminary review of NMFS observer data suggests that the proportion of observed longline sets impacted by sperm whales was variable in the GOA between 2002 and 2012. Sets targeting sablefish were identified based on the predominant groundfish species in the set. Between 2002 and 2012, 0 to 7 percent ($\bar{x}$= 1.1 percent) of sets were labeled as depredated by sperm whales in in the WGOA, 1 percent to14 percent ($\bar{x}$= 5.9 percent) in the CGOA, 0 to10 percent ($\bar{x}$= 4.3 percent) in WY, and 0 to 16 percent ($\bar{x}$= 5.9 percent) in SEO (Figure 20).

Figure 21 The proportion of sets labeled as impacted by "considerable sperm whale predation" by management area, NMFS observer commercial data 2002-2012



General information:

Three populations of sperm whales in the US are recognized: (1) California Current, (2) Hawaii, and (3) Alaska. Sperm whales present in the California Current are differentiated genetically, whereas sperm whales from the Hawaiian Archipelago and the eastern tropical Pacific could not be fully differentiated (Mesnick et al. 2011). High-latitude male sperm whales in Alaska originated from not one but multiple populations.

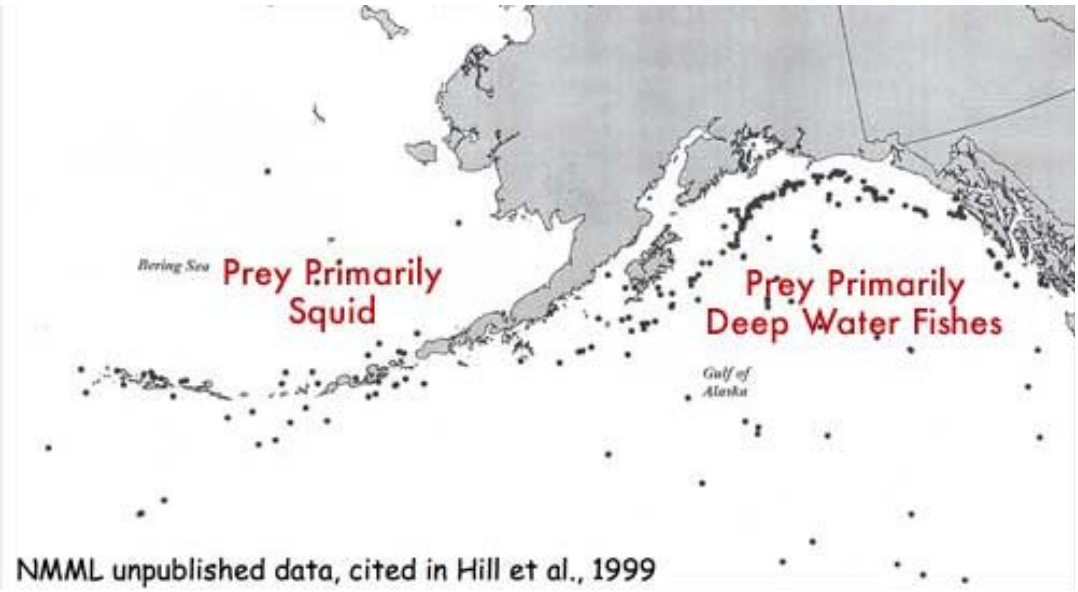
Horizontal movements of male sperm whales in the GOA consist of periodic, but not seasonal, transits between the lower latitude feeding/breeding grounds and higher latitude feeding grounds (Mesnick et al. 2011). At higher latitudes in the GOA, some individuals stayed in the same general area, while others were more nomadic. Sperm whales moving along the slope of the GOA are typically alone and rarely in pairs or travelling or diving in synchrony with another whale. While these whales may appear solitary, they could be connecting with each other acoustically, moving in a loosely connected group, and communicating long distances while spatially separated. Skilled depredators may be functioning as scouts by showing or leading other whales to foraging hotspots, as some fishermen have speculated (Mesnick et al. 2011).

The current population size of sperm whales in the GOA is unknown. Because they are an endangered species, fishermen and scientists are concerned about potential entanglements in fishing gear. Few reports of entanglement, injury or death in longline gear have been recorded. Such entanglements are costly and dangerous to fishermen and can force fishery closures. Entanglements in fishing gear with no apparent serious injury have been reported in Alaska (Angliss and Lodge 2003, Angliss and Outlaw 2005).

Mesnick et al. (undated expanded abstract) reports the following. All fishing grounds where depredation is reported to occur overlap with known natural feeding grounds of sperm whales. The species of fishes recorded during sperm whale depredation is often the same species reported to be found in the stomachs of sperm whales taken by whalers who years earlier were operating at the same sites. Fish were commonly found in sperm whale stomachs taken in the EGOA while squid was more common in whales

taken in the BS and Western Aleutian Islands (Okutani and Nemoto 1964). Depredating sperm whales appear to be selective in prey choice. For example, in Alaska bycatch is not regularly taken off of the lines, indicating that sperm whales might have the ability to select the type of fish they depredate (Straley 2005). Presumably, longliners have made it easier for sperm whales to forage by hauling their natural prey items closer to the surface. In general, lone males or small groups (2 to 7 individuals) participate in depredation activities (Purves et al. 2004, Hill and Mitchell 1998). However, the numbers may be larger at some sites and perhaps increasing. To date, all animals identified by eye (and by genetic sex determination in Alaska have been large sub-adults or adult males (Straley 2005).

Figure 22 Sperm whale sightings, 1958-1995.



The length of time from the onset of longline fishing in an area, to the first reports of depredation, to depredation being widespread has been reported. Examples can be drawn from Alaska where longlining began in the late 1800's, expanded to the GOA in 1982, and the first reported case of depredation occurred in1978 (T. O'Connell unpublished data). However, widespread reports of depredation did not occur until after 1997, after a transition from a "derby" style to IFQ fishing in 1995. Concomitantly, the fishing season increased from 10 days to 8.5 months, overlapping with the summer months during which sperm whales presence in the GOA increases by a factor of two (Mellinger et al. 2004). Longline fishing operations appear to provide an easier foraging method for sperm whales presumably because the whales remove fish as the line is hauled reducing time at depth (Thode et al. 2004). Much of the documentation of sperm whale depredation includes unpublished, anecdotal reports.

Whale deterrent work in progress/ongoing acoustic research for avoiding whale depredation[14]

Prevention and mitigation is likely to be most successful when the costs of fishing are greater than the benefits, risks to sperm whales are high, the association between the fishing vessel and food can be broken, and/or the opportunity for interaction is reduced by separating fishing and whales in space and/or time. *Interesting exceptions to the rules – areas where there is longline fishing but no sperm whale depredation – includes the eastern AI and BS.*

[14] Source: 2008 SAFE Report sablefish chapter and SEASWAP
http://www.seaswap.info/background/spermwhales.html

Thode et al. (2007) report on the use of passive acoustic recorders attached to anchor lines. These systems indicate that cavitation arising from changes in ship propeller speeds is associated with interruptions in nearby sperm whale dive cycles and changes in acoustically derived positions. This conclusion has been tested by cycling a vessel engine and noting the arrival of whales by the vessel, even when the vessel is not next to fishing gear. No evidence of response from activation of ship hydraulics or fishing gear strum has been found to date.

In 2003 the Southeast Alaska Sperm Whale Avoidance Project (SEASWAP) was created to investigate this issue with the long-term goal of reducing depredation. A collaborative study between fishermen, scientists and managers, SEASWAP works with both the coastal fishing fleet and the Federal sablefish survey to collect various quantitative data on longline depredation using the shape of the flukes as a unique identifier, SEASWAP found that at least 106 individual sperm whales have been involved in depredation. Bayesian mark-recapture analyses estimate at least 123 ([94-174]; 95 percent credible interval) depredating whales in the GOA study area.

In a second experiment, passive deterrent gear using small, acrylic beads attached near each hook were not effective. The SEASWAP team is working with Central Bering Sea Fisherman's Association and NOAA Bycatch Reduction Program. Investigations of active deterrents, including acoustic playbacks and bubblers are ongoing and continue further testing of decoy buoys.

3.4.1.1.2 North Pacific Right Whales

The right whale is listed as endangered under the ESA, and therefore designated as depleted under the MMPA. In 2008, NMFS relisted the North Pacific right whale as endangered as a separate species (*Eubalaena japonica*) from the North Atlantic species, *E. glacialis* (73 FR 12024, 06 March 2008). As a result, the stock is classified as a strategic stock. The abundance of this stock is considered to represent only a small fraction of its pre-commercial whaling abundance (i.e., the stock is well below its Optimum Sustainable Population). The estimated annual rate of human-caused mortality and serious injury is considered minimal for this stock (Muto et al., 2016). Potential threats to the habitat of this population derive primarily from commercial shipping and fishing vessel activity. There is considerable fishing activity within portions of the critical habitat of this species, increasing the risk of entanglement, although photographs of right whales taken to date have shown no evidence of entanglement scars and there have been no observed or reported interactions between the fisheries and right whales.

NMFS designated critical habitat for North Pacific right whales in areas that co-occur with groundfish fishing areas GOA in 2008. In 2006, NMFS recognized the potential for North Pacific right whales to be entangled in groundfish fishing gear given the overlap of right whales sightings and groundfish fishing areas (NMFS 2006b). As mentioned above, NMFS PRD determined that the Alaska groundfish fisheries were not likely to adversely affect the North Pacific right whale. The NMFS PRD determination considered the probability of exposure as well as the probability of harm in reaching its "not likely to adversely affect" determination. If a right whale were to become entangled in fishing gear the probability of harm would be high given the critical status of the species. However, given the considerable amount of fishing effort in the North Pacific with no recorded interactions with right whales, and very few documented sightings of right whales in waters off Alaska, NMFS PRD concluded that the Alaska groundfish fisheries (including the sablefish IFQ fishery and existing pot gear fisheries) were not likely to take North Pacific right whales.

NMFS published its final List of Fisheries (LOF) for 2016, as required by the MMPA. The final LOF for 2016 reflects new information on interactions between commercial fisheries and marine mammals. NMFS must classify each commercial fishery on the LOF into one of three categories under the MMPA based

upon the level of mortality and serious injury of marine mammals that occurs incidental to each fishery. The sablefish IFQ longline fishery is listed as a category III fishery in the 2016 List of Fisheries. Category III fisheries are fisheries determined to have a remote likelihood or no known incidental mortality and serious injury of marine mammals.

3.4.1.1.3 Humpback Whales

Gear entanglements may debilitate, seriously injure, or kill humpback whales. Between 2002 and 2006, there were incidental serious injuries and mortalities of central North Pacific humpback whales in the BSAI sablefish pot fishery (Angliss and Allen 2009). There were no observed interactions between the BSAI sablefish pot fishery and humpback whales from 2009 through 2013 and no observed interactions between humpback whales and Federal fisheries in the GOA (Muto et al., 2016). The current estimated mean annual mortality and serious injury rate of Western North Pacific humpback whales incidental to all U.S. commercial fisheries is 0.8 (0.6 based on observed fisheries + 0.2 based on stranding data). The current estimated mean annual mortality and serious injury rate of Central North Pacific humpback whales incidental to all U.S. commercial fisheries is 6.5 whales with 0.6 of these attributed to the Alaska groundfish fisheries (however, no interactions were observed in the GOA groundfish fisheries during this period).

On September 8, 2016, NMFS published a final decision changing the status of humpback whales under the ESA (81 FR 62259). In the 2016 decision, NMFS recognized the existence of 14 DPSs, classified four of those as endangered and one as threatened, and determined that the remaining nine DPSs do not warrant protection under the ESA. Three DPSs of humpback whales occur in waters off the coast of Alaska: the WNP DPS, which is an endangered species under the ESA, the Mexico DPS, which is a threatened species, and Hawaii DPS, which is not protected under the ESA. Whales from these three DPSs overlap to some extent on feeding grounds off Alaska.

Wade et al. (2016) estimated the probability of encountering humpback whales from each DPS in the North Pacific Ocean in the Gulf of Alaska (Table 9). Humpback whales from the endangered western North Pacific DPS are uncommon in the Gulf of Alaska. The threatened Mexico DPS has a higher probability of occurrence while humpback whales in the GOA are most likely to be from the Hawaii DPS.

Table 9 Probability of encountering humpback whales from each DPS in the North Pacific Ocean (columns) in the Gulf of Alaska. Adapted from Wade et al. (2016).

North Pacific Distinct Population Segments		
Western North Pacific DPS	Hawaii DPS	Mexico DPS
0.005 (CV = 0.0001)	0.890 (CV = 0.01)	0.105 (CV = 0.16)

The 2010 FMP biological opinion (NMFS 2010) concluded that the number of entanglements that that might result from interactions with groundfish fisheries appears to be low in contrast to other gear types. And, for such events that do occur with individual whales, the extent of entanglement from groundfish fisheries is not expected to have negative consequences for humpback whales in the North Pacific (NMFS 2010).

It is not known to what extent fishing vessel traffic in the GOA results in humpback whale injury or mortality due to ship strikes. Vessels engaged in groundfish fisheries likely disturb whales and pose a higher risk of collision than those posed by baseline conditions. The risk of vessel collision is higher during the summer months when the population of humpback whales in Alaska is at its peak. Throughout the remainder of the year, the chance of collision is likely to be low given the limited occurrence of

humpback whales. The incidence of ship strikes and/or serious injury from vessels involved in the groundfish fisheries are likely negligible, as fishing vessels usually operate at slow speeds and often spend their time in the pelagic environment rather than inside waters where humpbacks tend to forage.

Humpback whales may be disturbed by noise from fishing vessel engines. Research has suggested that noise may cause humpback whales to avoid or leave feeding or nursery areas. Other research has suggested that humpback whales may become habituated to vessel traffic and its associated noise. Still other researchers suggest that humpback whales may become more vulnerable to vessel strikes once they habituate to vessel traffic (NMFS 2010). In many cases, groundfish fishing vessels target different areas than those where humpback whales display high foraging site fidelity (e.g., Frederick Sound, Icy Strait, Lynn Canal, Kachemak Bay). In addition, these vessels are not targeting humpbacks in the manner that whale-watching vessels do by remaining in their vicinity for extended periods of time. Individual animals may experience disturbance by passing fishing vessels but is not expected to be of a magnitude to have significant impacts on the population in the GOA.

3.4.1.2 Alternative 2: Preferred Alternative

3.4.1.2.1 Killer Whales and Sperm Whales

Compared to the status quo, an unquantified, but positive, effect is expected from allowing the use of pot longline gear in the GOA sablefish IFQ fishery. The following rationale for selecting Alternative 2 as the preferred alternative summarizes information and research that is described under Section 3.1.1.1.

Sperm whales and killer whales that depredate on longline fishing gear could be negatively impacted. Diet data suggests the sablefish naturally comprises a portion of the sperm whale diet in Alaska, whereas killer whales are not known to naturally forage for sablefish, likely due to the depth range of sablefish (Rice 1989). Removing hooked sablefish from longline gear does not represent natural foraging for either whale species. Similar to "trash bears," there are risks associated with modifying marine mammal foraging behavior towards unnaturally available and unreliable prey resources such as hooked sablefish (Roche et al. 2007). Killer whales in particular exist in highly complex social groupings, and the effect that the depredation behavior could have on natural killer whale social structure is unknown. This effect could be even more pronounced if certain pods or individuals specialize in the depredation behavior as a primary foraging strategy during certain parts of the year. For instance, using photo-identification, Tixier et al. (2010) demonstrated that four out of eleven pods (35 out of 97 individuals) were involved in over 80 percent of the documented interactions with longline fisheries in the Crozet Exclusive Economic Zone (EEZ), indicating a degree of specialization. Whales that specialize in the depredation behavior could be at greater risk of negative impacts associated with the unnatural foraging behavior. Under the preferred alternative, there would be a reduced risk of modifying marine mammal foraging behavior towards an unnaturally available and unreliable prey resource (Roche et al. 2007).

Sperm whales and killer whales that depredate on longlining gear may be at greater risk of vessel strike and/or entanglement in fishing gear. Although cetacean entanglements in longline fishing gear are relatively rare, there are reports of sperm whales becoming entangled in longline fishing gear in Alaska (Hill 1999). The likelihood of killer whale entanglements in longline gear is very low; however, one female killer whale was incidentally captured in July 2004 off Brazil (Dalla Rosa and Sechi 2007). Neither sperm whales nor killer whales are known to depredate on pot fishing gear; thus, Alternative 2 could reduce the risk of marine mammal entanglements in fishing gear.

A controversial issue associated with whale depredation is the possibility that fishermen will act out against depredating sperm whales or killer whales. For instance, in the Crozet EEZ in the late 1990s and Prince William Sound in mid-1980s, depredating killer whales were photographed with bullet holes in

their dorsal fins (Tixier unpublished, Matkin 1988). Additionally, there are anecdotal accounts of longline fishermen using "seal bombs" or other deterrents in an attempt to deter whales from fishing gear. The effects of fishermen's potential frustration and use of deterrent are unknown. Alternative 2 could reduce the likelihood of any harmful measures being taken to deter or evade sperm whale or killer whale depredation.

The preferred alternative would address the purpose and need for the action, which stresses the need to:

1. Minimize fishery interactions with sperm whales in the CGOA and EGOA, and killer whales in the WGOA, and
2. Maximize the ability of sablefish quota share holders to harvest their sablefish IFQ by increasing catch per unit of effort and decreasing fishing costs.

No information in this analysis suggests that a temporal or seasonal shift in sablefish IFQ fishing is expected to occur under Alternative 2. In fact, a return to traditional fishing patterns might be expected, as shifts in fishing patterns to avoid whales would be discontinued by those fishermen who switch to pot longline gear. If some portion of the sablefish IFQ fleet switches to pot longlines, there will likely be decreased interactions between killer whales and sperm whales and fish sablefish fishery. This action would lead to fewer disturbances and reduced likelihood of entanglements. Overall, the preferred alternative is expected to result in beneficial impacts on killer whales and sperm whales compared with the status quo.

3.4.1.2.2 North Pacific Right Whales

Alternative 2, the preferred alternative, would allow participants in the GOA sablefish IFQ fishery the option of using longline pot gear instead of hook-and-line gear to target sablefish. The effects of the fishery on North Pacific right whales and designated critical habitat under Alternative 2 are expected to be the same as status quo. Additionally, Alternative 2 requires monitoring measures necessary to collected data on the use of longline pot gear. Alternative 2 requires the use of logbooks to record data on pot gear deployment and loss, specifically, a vessel operator using longline pot gear in the GOA must record the length of a longline pot set, the size of the pot, the spacing of pots, number of pots set, number of pots lost, and number of pots left on the fishing grounds still fishing, in addition to the other information required under current regulations. Additionally, Alternative 2 requires a vessel operator to use a VMS while using longline pot gear to fish for sablefish in the GOA. VMS monitors the location and movement of commercial fishing vessels in Federal fisheries in Alaska. Further, a vessel operator using longline pot gear in the GOA is subject to observer coverage under the North Pacific Observer Program. Using existing analytical tools, NMFS will be able to assess the amount of catch, effort, and areas where GOA sablefish pot gear is deployed. NMFS will have the fishery data necessary to compare pot gear deployment with available information on areas of right whale migrations.

Designated North Pacific right whale critical habitat in the GOA and the bathymetry in the vicinity of right whale critical habitat are shown in Figure 23. As shown in Figure 23, the water depth in the GOA right whale critical habitat is approximately 100 m, with the deepest depths of 200 m occurring in the southeast corner of designated critical habitat. The directed sablefish fishery occurs in deeper waters, along the continental slope ranging from 300 m to 1,000 m. The average depth of observed sablefish longline sets is 560 m. The directed fishery for sablefish with pot gear is expected to occur at similar depths. From 2010 through 2012, fewer than 30 of 4,200 total sablefish longline sets in Area 630 (the NMFS management area with designated right whale critical habitat in the GOA) occurred in waters shallower than 200 m. As with the determinations for the status quo fisheries, it is unlikely that directed fishing for sablefish with pot gear will adversely affect North Pacific right whales or its designated critical habitat.

Alternative 2 would establish a new fishery for purposes of the MMPA LOF. Should NMFS approve and implement Alternative 2, NMFS would include the GOA sablefish IFQ pot fishery as a fishery in the annual LOF in the future and determine the fishery category based on the level of mortality and serious injury of marine mammals in the fishery. Because this fishery has not yet commenced in the GOA, there would be no factual basis for making a category determination prior to implementation, other than by speculation or analogy to like gear.

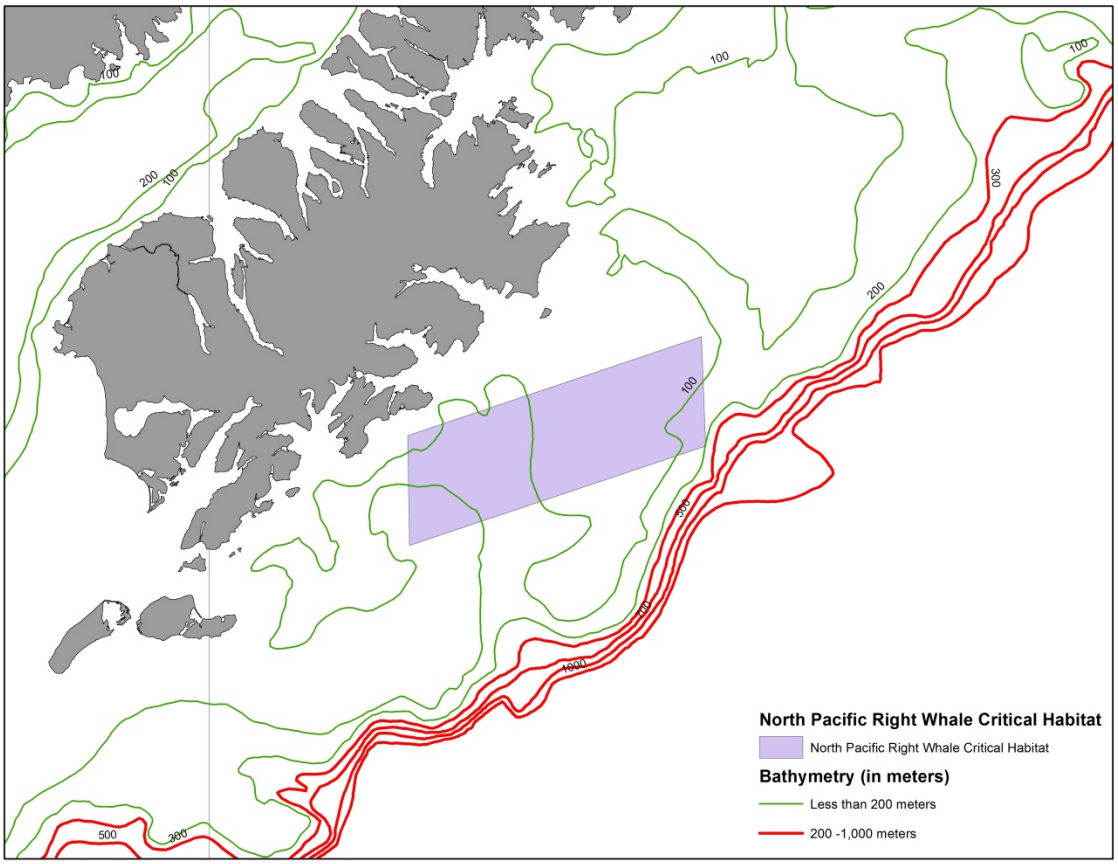


Figure 23 North Pacific right whale critical habitat and bathymetry in the GOA.

3.4.1.2.3 Humpback Whales

The effects of Alternative 2 on humpback whales are expected to be the same as the status quo. Additionally, Alternative 2 requires monitoring measures necessary to collected data on the use of longline pot gear. Alternative 2 requires the use of logbooks to record data on pot gear deployment and loss, specifically, a vessel operator using longline pot gear in the GOA must record the length of a longline pot set, the size of the pot, the spacing of pots, number of pots set, number of pots lost, and number of pots left on the fishing grounds still fishing, in addition to the other information required under current regulations. Additionally, Alternative 2 requires a vessel operator to use a VMS while using longline pot gear to fish for sablefish in the GOA. VMS monitors the location and movement of commercial fishing vessels in Federal fisheries in Alaska. Further, a vessel operator using longline pot gear in the GOA is subject to observer coverage under the North Pacific Observer Program. Using existing analytical tools, NMFS will be able to assess the amount of catch, effort, and areas where GOA sablefish pot gear is deployed. NMFS will have the fishery data necessary to compare pot gear deployment with available information on areas of humpback migrations.

Pot gear is deployed in GOA crab and Pacific cod fisheries under the status quo and Alternative 2 would allow participants in the GOA sablefish IFQ fishery the option of using longline pot gear instead of hook-and-line gear to target sablefish. With the exception of the BSAI flatfish trawl, pollock trawl, and Pacific cod longline fisheries, all Federal groundfish fisheries in the BSAI and GOA are Category III fisheries in the 2016 LOF, meaning that they have a remote likelihood of or no know incidental mortality and serious injury of marine mammals. Based on analogy of the BSAI sablefish IFQ pot fishery and other existing Federal pot fisheries in the GOA, the additional pot gear that may be on the fishing grounds under Alternative 2 is not likely to increase the risk of entanglements of humpback whales in the GOA relative to status quo. There were no documented marine mammal interactions in the Bering Sea IFQ sablefish pot fishery or the BSAI Pacific cod pot fishery from 2008 through 2012 and one harbor seal mortality in the GOA Pacific cod pot fishery from 2008 through 2012 (81 FR 20550). Alternative 2 would not modify the action analyzed in the 2010 FMP biological opinion (NMFS 2010) in a manner that would cause effects to listed species or critical habitat that were not considered in the 2010 FMP biological opinion.

Alternative 2 would establish a new fishery for purposes of the MMPA LOF. Should NMFS approve and implement Alternative 2, NMFS would include the GOA sablefish IFQ pot fishery as a fishery in the annual LOF in the future and determine the fishery category based on the level of mortality and serious injury of marine mammals in the fishery. Because this fishery has not yet commenced, there would be no factual basis for making a category determination prior to implementation, other than by speculation or analogy to like gear. If new information in the future reveals that the effects of a GOA sablefish IFQ fishery may affect listed species or critical habitat in a manner not considered in prior biological opinions, or if there is incidental take of a humpback whale in the fishery, NMFS would reinitiate ESA section 7 consultation to insure the effects of the fishery are not likely to jeopardize the continued existence of any ESA-listed humpback whale DPSs.

3.5 Seabirds

Thirty-eight species of seabirds breed in Alaska. Breeding populations are estimated to contain 36 million individual birds in Alaska, and total population size (including sub-adults and non-breeders) is estimated to be approximately 30 percent higher. Five additional species that breed elsewhere but occur in Alaskan waters during the summer months contribute another 30 million birds.

Species nesting in Alaska

Tubenoses-Albatrosses and relatives: Northern Fulmar, Fork-tailed Storm-petrel, Leach's Storm-petrel

Kittiwakes and terns: Black-legged Kittiwake, Red-legged Kittiwake, Arctic Tern, Aleutian Tern

Pelicans and cormorants: Double-crested Cormorant, Brandt's Cormorant, Pelagic Cormorant, Red-faced Cormorant

Jaegers and gulls: Pomarine Jaeger, Parasitic Jaeger, Bonaparte's Gull, Mew Gull, Herring Gull, Glaucous-winged Gull, Glaucous Gull, Sabine's Gull

Auks: Common Murre, Thick-billed Murre, Black Guillemot, Pigeon Guillemot, Marbled Murrelet, Kittlitz's Murrelet, Ancient Murrelet, Cassin's Auklet, Parakeet Auklet, Least Auklet, Whiskered Auklet, Crested Auklet, Rhinoceros Auklet, Tufted Puffin, Horned Puffin

Species that visit Alaska waters

Tubenoses: Short-tailed Albatross, Black-footed Albatross, Laysan Albatross, Sooty Shearwater, Short-tailed Shearwater

Gulls: Ross's Gull, Ivory Gull

As noted in the PSEIS (NMFS 2004), seabird life history includes low reproductive rates, low adult mortality rates, long life span, and delayed sexual maturity. These traits make seabird populations extremely sensitive to changes in adult survival and less sensitive to fluctuations in reproductive effort. The problem with attributing population changes to specific impacts is that, because seabirds are long-lived animals, it may take years or decades before relatively small changes in survival rates result in observable impacts on the breeding population.

More information on seabirds in Alaska's EEZ may be found in several NMFS, Council, and USFWS documents:

- More information on the USFWS Migratory Bird Management program is at: http://alaska.fws.gov/mbsp/mbm/index.htm
- Section 3.7 of the PSEIS (NMFS 2004) provides background on seabirds in the action area and their interactions with the fisheries. This may be accessed at http://www.alaskafisheries.noaa.gov/sustainablefisheries/seis/final062004/Chaps/chpt_3/chpt_3_7.pdf
- The annual Ecosystems Considerations chapter of the SAFE reports has a chapter on seabirds; the December 2013 chapter can be found here: http://www.afsc.noaa.gov/REFM/docs/2013/ecosystem.pdf .
- The Seabird Fishery Interaction Research webpage of the Alaska Fisheries Science Center: http://www.afsc.noaa.gov/refm/reem/Seabirds/Default.htm
- The NMFS Alaska Region's Seabird Incidental Take Reduction webpage: http://www.alaskafisheries.noaa.gov/protectedresources/seabirds.html
- The BSAI and GOA groundfish FMPs each contain an "Appendix I" dealing with marine mammal and seabird populations that interact with the fisheries. The FMPs may be accessed from the Council's home page at http://www.npfmc.org/fishery-management-plans/
- Washington Sea Grant has several publications on seabird takes, and technologies and practices for reducing them: http://www.wsg.washington.edu/publications/online/index.html
- The seabird component of the environment affected by the groundfish FMPs is described in detail in Section 3.7 of the PSEIS (NMFS 2004).
- Seabirds and fishery impacts are also described in Chapter 9 of the Alaska Groundfish Harvest Specifications EIS (NMFS 2007).

3.5.1 Effects on Seabirds

Table 10 explains the criteria used in this analysis to evaluate the significance of the effects of fisheries on seabird populations.

Table 10 Criteria used to determine significance of impacts on seabirds.

	Incidental take	Prey availability
Insignificant	No substantive change in takes of seabirds during the operation of fishing gear.	No substantive change in forage used by seabirds.
Adverse impact	Non-zero take of seabirds by fishing gear.	Reduction in forage fish populations, or the availability of forage fish, to seabird populations.
Beneficial impact	Decreased fishery interactions with fishing gear can be identified.	Availability of offal from fishing operations may provide additional, readily accessible, sources of food.
Significantly adverse impact	Trawl and hook-and-line take levels increase substantially from the baseline level, or level of take is likely to have population level impact on species.	Food availability decreased substantially from baseline such that seabird population level, survival, or reproduction success is likely to decrease.
Significantly beneficial impact	No threshold can be identified.	Food availability increased substantially from baseline such that seabird population level, survival, or reproduction success is likely to increase.
Unknown impacts	Insufficient information available on take rates or population levels.	Insufficient information available on abundance of key prey species or the scope of fishery impacts on prey.

3.5.1.1 Alternative 1: No Action

The current prohibition of the use of pot (single or longline) gear in the GOA would not minimize potential fishery interactions with seabirds, and thus would fail to address one of the objectives noted in the Council's purpose and need statement (Section 1.1).

Fishing vessels in the GOA encounter seabirds (e.g. albatrosses, fulmars, gulls, shearwaters) during the course of fishing. Many seabird species are attracted to fishing vessels in order to forage on bait, offal, discards, and other prey made available by fishing operations. The sight and sound of swarming birds can attract other birds from many miles around. These interactions can result in direct mortality for seabirds if they become entangled in fishing gear or strike the vessel or fishing gear while flying. Interactions with longline fisheries are of particular concern, as seabirds are attracted to sinking baited hooks and can become hooked and drowned.

Seabirds are incidentally caught in Alaskan commercial groundfish fisheries operating in Federal waters of the U.S. Exclusive Economic Zone. Fisheries observers record incidental seabird catch from their sample and other sources while on board these demersal longline, pot, pelagic trawl, and non-pelagic trawl vessels. The AFSC reports the estimates of total seabird mortality from these fisheries each year. Estimates are based on two sources of information: (1) data provided by NMFS-certified fishery observers deployed to vessels and floating or shoreside processing plants, and (2) industry reports of catch and production. The 2007 through 2012 seabird mortality estimates presented here (Table 11) are produced from the NMFS Alaska Regional Office Catch Accounting System (CAS).

The estimates in Table 11 update those previously reported from 1993 to 2006. These numbers do not apply to gillnet, seine, troll, or halibut hook-and-line fisheries. Data collection on the Pacific halibut longline fishery began in 2013 and will be summarized in the future. Figure 1 shows seabird mortality in the groundfish fisheries for 1993 through 2012, using results from two analytical methods employed. The AFSC produced estimates from 1993 through 2006, and the CAS produced estimates from 2007 through 2012.

The 2012 incidental seabird catch numbers for the combined groundfish fisheries are 40 percent below the 5-year average of 8,295 for 2007 through 2011. Incidental catch of albatross was reduced in 2012 by

27 percent compared to the previous five years, with the greatest decrease in Laysan (*Phoebastria immutabilis*) versus Black-footed (*P. nigripes*) Albatross (36 percent and 11 percent declines, respectively). Incidental catch of Northern fulmar (*Fulmaris glacialis*), down by 39 percent compared to the 5-year average and 52 percent from the year before, remained the highest proportion in the catch at 61 percent. Incidental catch of Fulmar has ranged between 45 percent and 76 percent of the total seabird take since 2007. Average annual mortality for fulmars since 2007 has been 4,586. However, when compared to estimates of total population size in Alaska of 1.4 million, this represents an annual 0.33 percent mortality due to fisheries. There is some concern that the mortality could be colony-specific, possibly leading to localized depletions.

The demersal longline fishery in Alaska typically drives the overall estimated incidental catch numbers and constitutes about 91 percent of fisheries-related seabird mortality, on an annual basis (but see comment regarding trawl estimates below). Incidental seabird mortality in the longline fishery showed a marked decline beginning in 2002 due to the deployment of streamer lines as bird deterrents. Since then, annual incidental catch has remained below 10,000 birds, dropping as low as 3,704 in 2010. Numbers increased to 8,914 in 2011, the second highest in the streamer line era, but fell back to 4,544 in 2012. The increased numbers in 2011 were due to a doubling of the gull (*Larus* spp.) numbers (1,084 to 2,206) and a 3-fold increase in fulmars, from 1,782 to 5,848. These species group numbers have decreased in 2012 as well, to 885 and 3,016 respectively. There are many factors that may influence annual variation in incidental catch rates, including seabird distribution, population trends, prey supply, and fisheries activities. Work has continued on developing new and refining existing mitigation gear.

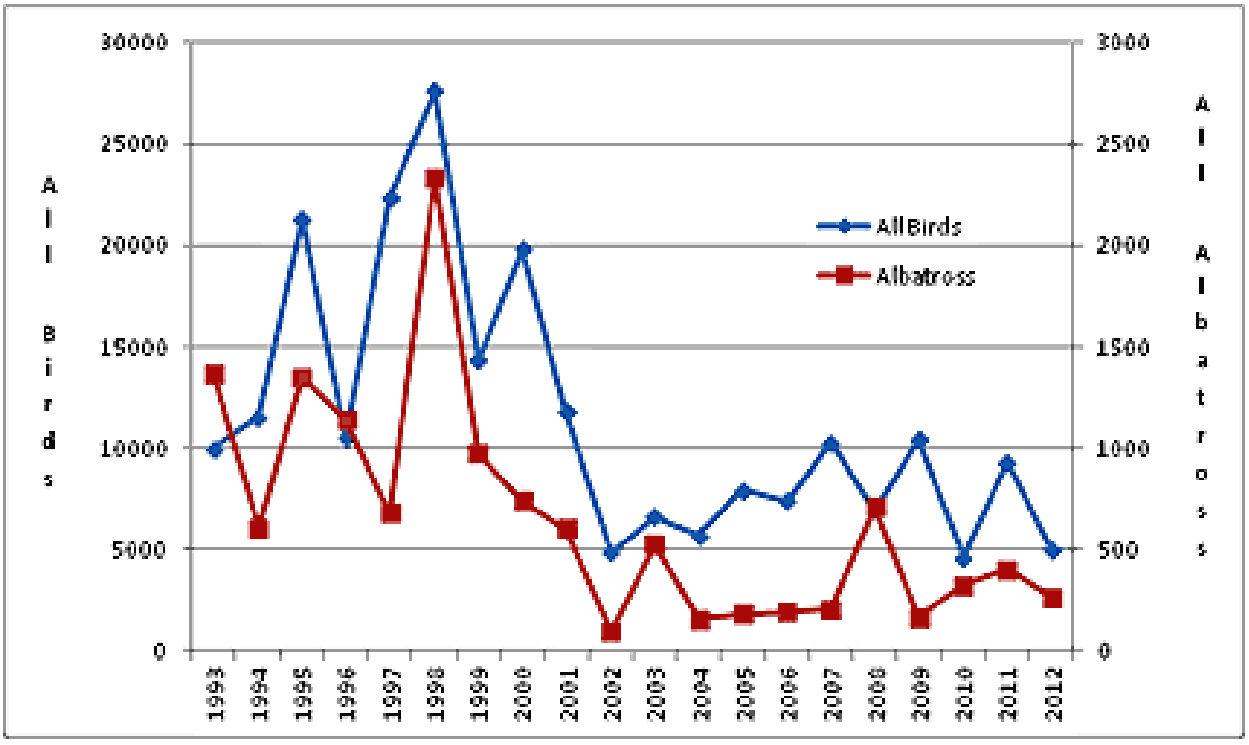
Incidental catch of albatross varied annually. The greatest numbers of albatross were caught in 2008. In 2012, 57 percent of albatross mortality occurred in the Gulf of Alaska (GOA) (down from 87 percent in 2011). The GOA typically accounts for 10 percent to 20 percent of overall incidental seabird catch. Only Laysan Albatross were taken in the BSAI, and all Black-footed Albatross were taken in the GOA (along with about 14 Laysan). While the estimated take of Black-footed Albatross underwent a 4-fold increase (44 to 206) between 2010 and 2011, the 2012 numbers are about 11 percent under the long-term average of 153 birds per year. Although the Black-footed Albatross is not endangered (like its relative, the Short-tailed Albatross), it was considered for listing as threatened and is currently a Bird of Conservation Concern by the U.S. Fish & Wildlife Service.

Of special concern is the endangered Short-tailed Albatross (*Phoebastria albatrus*). A biological opinion was published for the groundfish longline fishery in September 2003, which identified an expected, observed incidental take level of four Short-tailed Albatross in each 2-year period. Between 2003 and 2012, only two Short-tails were incidentally taken in 2010 and one bird was taken in 2011. Based on these two incidents, the projected takes were 15 and 5 birds, respectively. No takes were reported in 2013.

Table 11 Total estimated incidental mortality of seabirds in Alaskan Federal groundfish fisheries, all gear types and Fishery Management Plan areas combined, 2007 through 2013. (Source: NMFS)

Species/Species Group	Year						
	2007	2008	2009	2010	2011	2012	2013
Unidentified Albatross	16	0	0	0	0	0	0
Short-tailed Albatross	0	0	0	15	5	0	0
Laysan Albatross	17	420	114	267	189	128	189
Black-footed Albatross	176	290	52	44	206	136	249
Northern Fulmar	4,581	3,426	7,921	2,357	6,214	3,016	3,277
Shearwater	3,602	1,214	622	647	199	510	191
Storm Petrel	1	44	0	0	0	0	0
Gull	1,309	1,472	1,296	1,141	2,208	885	556
Kittiwake	10	0	16	0	6	5	3
Murre	7	5	13	102	14	6	3
Puffin	0	0	0	5	0	0	0
Auklet	0	3	0	0	0	7	4
Other Alcid	0	0	105	0	0	0	0
Other Bird	0	0	136	0	0	0	0
Unidentified	509	40	166	18	259	284	267
Total	10,228	6,914	10,441	4,596	9,298	4,977	4,739

Figure 24 Incidental mortality of seabirds in Alaskan groundfish fisheries, all gear types combined, 1993 to 2012. Total estimated bird numbers are shown in the left-hand axis while estimated albatross numbers are shown in the right-hand axis



The longline fleet has traditionally been responsible for about 91 percent of the overall incidental mortality of seabirds in Alaska, as determined from the data sources noted above. However, standard fisheries observer sampling methods on trawl vessels do not account for additional mortalities from net entanglements, cable strikes, and other sources. Thus, the trawl estimates are biased low. For example, the 2010 estimate of trawl-related seabird mortality is 823, while the additional observed mortalities (not included in this estimate and not expanded to the fleet) were 112. Fisheries observers now record the additional mortalities they see on trawl vessels and the AFSC Seabird Program is seeking funds to support an analyst to work on how these additional numbers can be folded into an overall estimate. The challenge to further reduce seabird mortality is great given the rare nature of the event. For example, in an analysis of 35,270 longline sets from 2004 to 2007, the most predominant species, Northern Fulmar, only occurred in 2.5 percent of all sets. Albatross, a focal species for conservation efforts, occurred in less than 0.1 percent of sets. However, given the vast size of the fishery, the total estimated incidental catch can add up to hundreds of Albatross or thousands of Fulmars (Table 11).

The AFSC remains committed to work with the fishing industry, Washington Sea Grant, and others to meet the challenges of further reducing incidental mortality of seabirds. Seabird mitigation gear used on longline vessels can substantially reduce seabird mortality. Individual vessel performance varies, and further reduction of overall fleet averages may depend on targeted improved performance for a handful of vessels within the fleet. Additional methods, such as integrated weight longline gear, have been researched and shown to be effective. Continued collaboration with the longline industry will be important. Incidental catch of albatross in the Gulf of Alaska is generally higher than in other regions. With the North Pacific Groundfish and Halibut Observer Program (Observer Program) restructuring and the deployment plan recommended by NMFS and approved by the North Pacific Fishery Management Council, we will have a better sense of albatross mortality issues within GOA fisheries.

Avoidance of incidental seabird mortality:

The Alaska fishing industry and the Council have focused particular attention on conservation and protection of the short-tailed albatross, an endangered species listed under the U.S. Endangered Species Act. ‘Takes’ of four short-tailed albatrosses in groundfish longline fisheries, or two in the halibut hook-and-line fishery, within a two-year period could trigger re-initiation of a Section 7 consultation in these respective fisheries and may interrupt or even close the respective fishery pending completion of a new Section 7 consultation. Takes of only two short-tailed albatrosses over five years could disrupt or close the Alaskan trawl fisheries.

In 1996, the Council established mandatory seabird avoidance measures for the longline fisheries, and approved more stringent requirements in 2001 (Figure 24). Seabird deterrent devices such as buoy bags or streamer lines are required for most groundfish longline fishing vessels. The Council has encouraged fishing industry initiatives to conduct research on new seabird avoidance measures, including studies on the effectiveness of paired streamer lines and integrated weight ground lines, and the development of techniques for minimizing seabird strikes with trawl warps and sonar transducer cables.

These research efforts, which were largely prompted by voluntary action on the part of the longline sector of the industry, indicated that paired streamer lines were nearly 100 percent effective at eliminating the catch of albatrosses and other surface-feeding birds. The sablefish and Pacific cod longline fishing fleets adopted this new technology two years before it was required, resulting in an eight-fold decrease in seabird mortality.

Implemented in January 2008, the Council's action specified that the use of seabird avoidance measures would not be required in Prince William Sound, Cook Inlet, and inside waters in Southeast Alaska except in outer Chatham Strait, Dixon Entrance, and outer Cross Sound. The Council action also identified

performance standards for small vessels (those greater than 26 feet and less than or equal to 55 feet length overall) fishing in outside waters, and modified how seabird deterrent devices be used by small vessels.

Figure 25 Seabird streamer lines required in North Pacific longline fisheries.

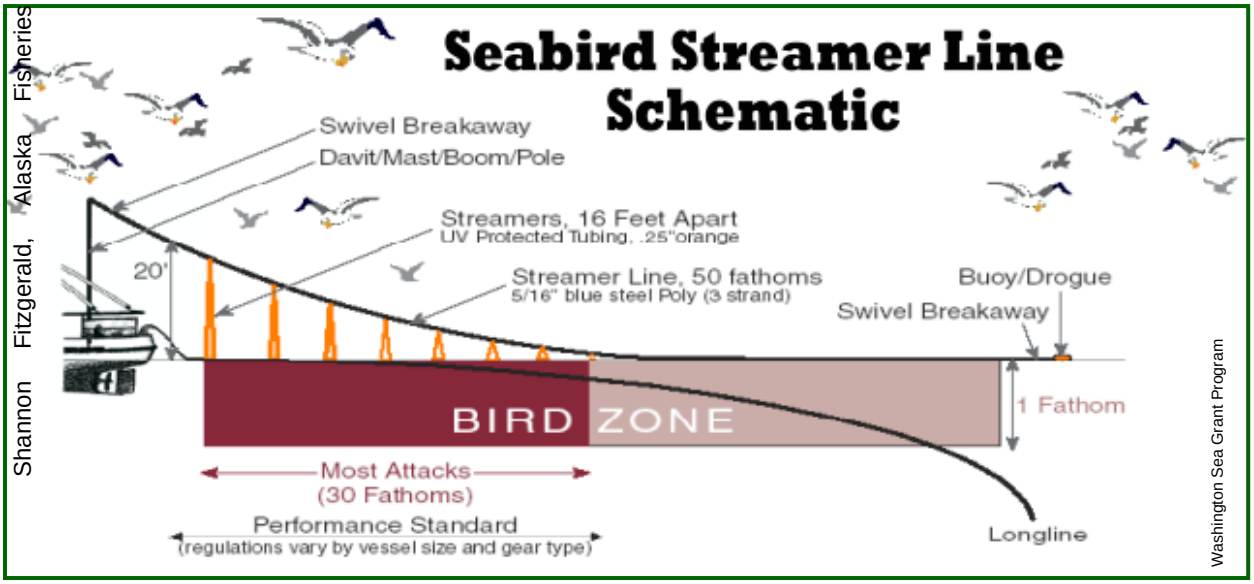
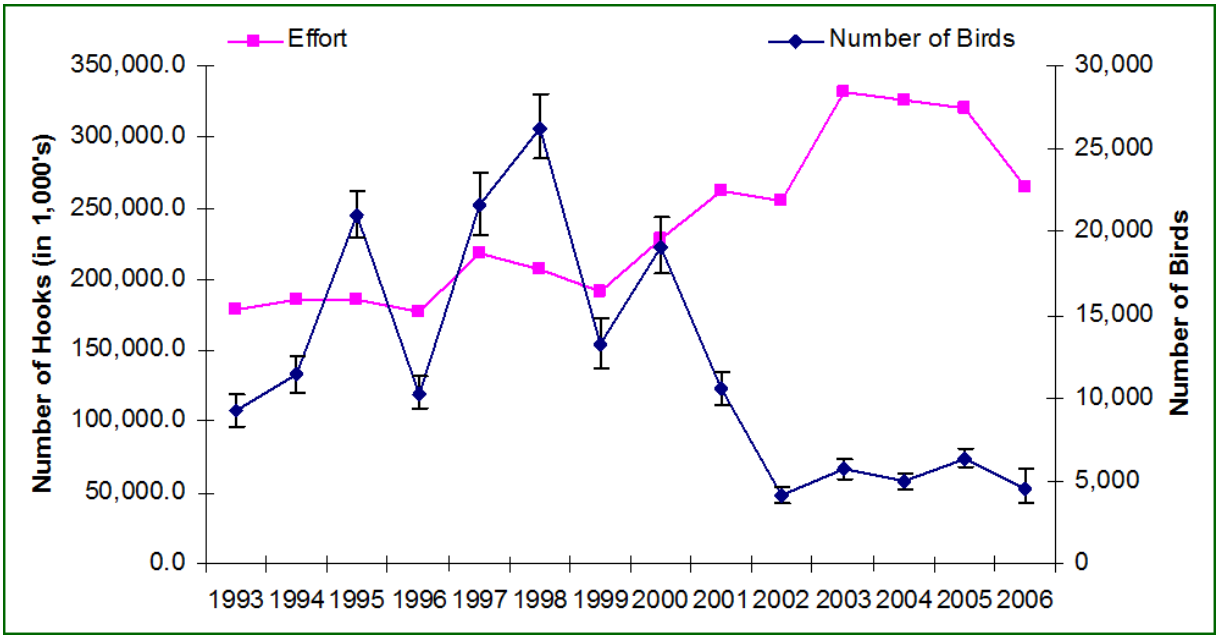


Figure 26 Number of hooks and number of seabirds, 1993 – 2006 (Source: NMFS)



3.5.1.2 Alternative 2: Preferred Alternative

Alternative 2, the Council's preferred alternative, would allow sablefish IFQ fishermen to choose between using hook-and-line gear and pot longline gear. A transition from hook-and-line gear to pot longline gear is expected to reduce seabird interactions and decrease the likelihood of incidental takes of seabirds, which the Council views as a beneficial outcome of the proposed action. These decreased fishery interactions likely result from decreased prey availability. While decreased prey availability may negatively impact seabirds in the short run because they must return to natural predatory behavior, it

benefits their survival in the long run due to decreased likelihood of entanglements that could result in drowning or injury.

To provide a sense of this action's effect on seabirds, direct comparisons can be made for pot and HAL longline gear in specific fisheries and regions. Both pot gear (single and longline) and HAL longline gear is allowed in the BS sablefish fishery. Pacific cod pot and HAL longline fisheries occur in the GOA. A comparison of seabird mortality in these fisheries would ideally include some measure of the units of effort and an equivalency between HAL fisheries versus pot fisheries. The AFSC is currently working on methods to report standardized effort in each fishery, although that information is not yet available for this analysis. Direct comparisons of species taken and overall numbers are available, however. The following CAS data report seabird mortality from 2007 through 2013.

A direct comparison of seabird mortality in pot fisheries in two gear types in the BSAI sablefish fishery can be made. During 2007 through 2013 a total of 751 birds were taken in the sablefish HAL longline fishery, including 19 black-footed albatross and 376 Laysan albatross. During this time, albatross composed more than 50 percent of overall incidental catch. During the same time period, the pot fishery took 11 seabirds, including 6 Northern fulmars and 5 shearwater spp.

In the GOA, a comparison of HAL and pot seabird mortality for the Pacific cod fisheries found that from 2007 through 2013 the total estimated mortality in the cod HAL fishery was 1,802 seabirds, including 27 albatross (9 black-footed and 18 Laysan). The highest proportion of seabird mortality was Northern fulmar at 1,035 birds, or 57 percent of the total. The Pacific cod pot fishery estimate for this same time period was 458 birds including 60 gulls and 398 fulmars. No albatross were taken.

Note that seabird mortality in pot fisheries includes either surface-feeding (gulls and Northern fulmars) or shallow-diving (shearwater) seabird species. These birds are not captured by pot gear while it is being actively fished. Information from observers supports the conjecture that these birds are getting into the pots before the gear is set, typically during inclement weather. Given the data available and the nature of the fishery, pot gear appears to pose no threat to albatross species.

During the 2007 through 2013 time period, incidental seabird mortality in the GOA sablefish HAL fishery totaled 5,313 birds, including 1,604 albatross (1,057 black-footed, 524 Laysan, and 23 unidentified). Northern fulmar were the predominant species (2,133; 40 percent) followed by gull species (1,381; 26 percent). By selecting a preferred alternative that allows the use of pot longline gear, the Council intends to promote an overall reduction in seabird mortality; the amount of albatross taken during fishing activity should be especially reduced.

No substantive changes in prey availability or gear impact on benthic habitat used by seabirds for foraging have been identified under the preferred alternative. No information in this analysis suggests that a temporal or seasonal shift in sablefish IFQ fishing is expected to occur under Alternative 2. In fact, a return to traditional fishing patterns might be expected under the preferred alternative, as altered fishing patterns to avoid seabirds would be expected to continue to occur under the status quo.

Overall, the preferred alternative is expected to result in beneficial impacts on seabirds compared to the status quo.

3.6 Cumulative Effects

NEPA requires an analysis of the potential cumulative effects of a proposed Federal action and its alternatives. Cumulative effects are those combined effects on the quality of the human environment that result from the incremental impact of the proposed action when added to other past, present, and

reasonably foreseeable future actions (RFFA), regardless of which Federal or non-Federal agency or person undertakes such other actions (40 CFR 1508.7, 1508.25(a) and 1508.25(c)). Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time. The concept behind cumulative effects analysis is to capture the total effects of many actions over time that would be missed if evaluating each action individually. Concurrently, the Council on Environmental Quality (CEQ) guidelines recognize that it is most practical to focus cumulative effects analysis on only those effects that are truly meaningful. Based on the preceding analysis, the effects that are meaningful are potential effects on sablefish, halibut, GOA FMP groundfish species. For sperm whales, killer whales, and seabirds, the potential effects are beneficial but not quantifiable because it is not possible to know how many sablefish fishermen will choose to use longline pot gear instead of hook-and-line gear in the GOA. NMFS has the appropriate monitoring measures in place to analyze and understand any future effects from longline pot gear on these species. The cumulative effects on other resources have been analyzed in numerous documents, and the impacts of this proposed action and alternatives on those resources is minimal; therefore, there is no need to conduct an additional cumulative impacts analysis.

This section provides a review of the RFFAs that may result in cumulative effects on sablefish, halibut, and other GOA groundfish FMP species. Identification of actions likely to impact a resource component within this action's area and timeframe allow the public and the Council to make a reasoned choice in selecting a preferred alternative. Actions are understood to be human actions (e.g., a proposed rule to designate northern right whale critical habitat in the Pacific Ocean), as distinguished from natural events (e.g., an ecological regime shift). Actions are considered reasonably foreseeable if some concrete step has been taken toward implementation, such as a Council recommendation or NMFS's publication of a proposed rule. Actions that are only "under consideration" may change substantially or may not be adopted, and so interactions with those actions are difficult to describe and predict with certainty.

The Council's preferred alternative recommends a regulatory amendment that would allow the retention of halibut IFQ in sablefish pot gear in the parts of halibut regulatory Area 4A that overlap the BS and AI groundfish management areas (Alternative 2, Element 4). The Council received a discussion paper on this topic in April 2015. Based on the five most recent years of complete information, between 25 and 45 of the sablefish IFQ participants that would be affected by the action under consideration for the GOA also participate in sablefish IFQ or CDQ fishing in the sablefish management areas that overlap with halibut regulatory Area 4A. Allowing the retention of halibut in sablefish pots could reduce halibut discards. The Council chose not to take further action on the Area 4A halibut retention action in April 2015, though it could revisit that decision in the future.

In 2015, the Council will be considering a proposal that would allow commercial halibut IFQ holders to voluntarily sell quota to the charter sector. If that is permitted, there could be marginally less halibut IFQ held on vessels fishing for sablefish with pots. Alternative 2, Element 4 of the Council's preferred alternative would allow retention of halibut in sablefish pots if sufficient IFQ is held on the vessel, therefore it is feasible that the RFFA highlighted in this paragraph could lead to instances of additional halibut discards. This impact is not likely to be significant, as one would not expect an individual to voluntarily transfer away halibut that he or she needs to cover pot longline sablefish fishing effort.

The Council is developing a GOA trawl bycatch management program that, if implemented, could have cumulative effects on the communities that are involved in the GOA sablefish IFQ fishery. The impacts of a management regime change in the trawl fishery cannot be predicted until the nature of the program is fully defined. However, one element of that program could potentially lower halibut PSC limits for the trawl fishery. If so, the directed HAL fishery for halibut, in which many sablefish fisherman participate, could experience a positive effect. In June 2015, the Council recommended a preferred alternative to reduce halibut PSC limits in BSAI fisheries; that PSC reduction is expected to have similar positive effects on the directed HAL fishery. NMFS published a final for the reduced halibut PSC limits on April

27, 2016 (81 FR 24714). Viewed from the opposite perspective, reduced halibut mortality from whale depredation on longlines, through the use of pot gear, could marginally increase the amount of halibut that is encountered in trawl fisheries. Increased halibut PSC in trawl fisheries has a negative impact on trawl fishery stakeholders, as hard caps may curtail their fishing opportunities.

Considering the direct and indirect impacts of the proposed action, when added to the impacts of past, present, and reasonably foreseeable actions analyzed in other documents (incorporated here by reference), the cumulative impacts of the Council's preferred alternative are determined to be not significant.

4 Regulatory Impact Review

This Regulatory Impact Review (RIR) examines the benefits and costs of a proposed regulatory amendment to allow the use of pot longline gear for the sablefish IFQ fishery in the GOA. The measures in the Council's preferred alternative include: redefining legal gear to include pot longline gear, limits on the number of pots that a vessel can fish in a given GOA management area, limits on the amount of time that pot longline gear can be left on the fishing grounds, gear marking requirements, and required retention of incidentally caught Pacific halibut if sufficient IFQ are held by individuals onboard the vessel.

The preparation of an RIR is required under Presidential Executive Order (E.O.) 12866 (58 FR 51735: October 4, 1993). The requirements for all regulatory actions specified in E.O. 12866 are summarized in the following Statement from the E.O.:

> *In deciding whether and how to regulate, agencies should assess all costs and benefits of available regulatory alternatives, including the alternative of not regulating. Costs and Benefits shall be understood to include both quantifiable measures (to the fullest extent that these can be usefully estimated) and qualitative measures of costs and benefits that are difficult to quantify, but nonetheless essential to consider. Further, in choosing among alternative regulatory approaches agencies should select those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity), unless a statute requires another regulatory approach.*

E.O. 12866 requires that the Office of Management and Budget review proposed regulatory programs that are considered to be "significant." A "significant regulatory action" is one that is likely to:

- Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, local or tribal governments or communities;
- Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;
- Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or
- Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this Executive Order.

4.1 Statutory Authority

Under the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 USC 1801, *et seq*.), the United States has exclusive fishery management authority over all marine fishery resources found within the exclusive economic zone (EEZ). The management of these marine resources is vested in the Secretary and in the regional fishery management councils. In the Alaska Region, the Council has the responsibility for preparing fishery management plans (FMPs) and FMP amendments for the marine fisheries that require conservation and management, and for submitting its recommendations to the Secretary. Upon approval by the Secretary, NMFS is charged with carrying out the Federal mandates of the Department of Commerce with regard to marine and anadromous fish.

The sablefish IFQ fishery in the EEZ off Alaska subject to this action is managed under the FMP for Groundfish of the GOA. The proposed action (preferred alternative) would amend this FMP and Federal regulations at 50 CFR 679, and may also require amendments to IPHC regulations if the IPHC takes

complementary action to allow for the implementation of Alternative 2, Element 4 in the preferred alternative (see Section 4.3.2). Actions taken to amend FMPs or implement other regulations governing these fisheries must meet the requirements of Federal law and regulations.

4.2 Purpose and Need for Action

The Council adopted the following purpose and need statement in December 2014, and affirmed it when taking final action in April 2015.

> *Interactions with whales throughout the Gulf of Alaska affect the ability of sablefish quota share holders to harvest their sablefish IFQs 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 Gulf of Alaska. 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.*

4.3 Alternatives

4.3.1 Alternatives Considered at Final Action

The following alternatives, elements, and options for the proposed action were established in December 2014. These alternatives represent the range of management options that were analyzed for consideration during the selection of the preferred alternative, at the Council's April 2015 meeting. The draft regulations provided in Section 4.9 are in reference to this version of the action alternative. Alternatives that the Council considered during the development process, but did not advanced for further analysis, are described in Section 2.4.

Alternative 1. No Action.

Alternative 2. Allow the use of pot longline gear in the GOA Sablefish IFQ fishery (the Council can select any or all GOA areas: WGOA, CGOA, WY, or SEO).

Element 1. Limit of 60 to 400 pots (different pot limits can be selected for each area).

Option 1. Require identification tags for each pot.

Element 2. Gear retrieval

Option 1. Require the location of pots set, left, or lost on the grounds to be submitted to an electronic database when in the water.

Option 2. Gear cannot be left more than (Options) four or seven days without being moved.

Element 3. Gear specifications.

Require both ends of the sablefish pot longline set to be marked with buoys and/or flagpoles and transponders that work with AIS or an equivalent system.

Element 4. Retention of incidentally caught halibut.

Allow the retention of halibut caught incidentally in sablefish pots, provided the sablefish IFQ holder also holds sufficient halibut IFQ.

The Council had instructed staff to provide additional information on past and ongoing industry/research efforts to deter or avoid whales during hook-and-line longline fishing (see Section 4.7).

The Council gave two explanatory notes regarding Element 2, Option 2. First, the requirement to "move" gear could also be satisfied by tending the gear. In other words, a fisherman would only need to haul and re-set the gear within the defined time limitation. Second, the Council could select both four and seven days as part of its preferred alternative if the time limits were each applied in a different context. For example, one limit could pertain to moving or tending gear during the fishing season, and the other limit could pertain to removing the gear from the fishing grounds within a certain period after the fishery is closed or after the fisherman fully harvests his annual IFQ.

4.3.2 Council's Preferred Alternative

In April 2015, the Council adopted the following as its preferred alternative:

Alternative 2. Allow the use of pot longline gear in the GOA Sablefish IFQ fishery.

Element 1. *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.

Option 2. *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.

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 longline pot fishery under the requirements of regulations implementing this program.

Additionally, all vessels using longline pot 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 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.

A review on the effects of allowing GOA Sablefish longline pot gear will be conducted 3 years after implementation and that NMFS include pot gear effort in their management report to the Council.

While deliberating this selection of the preferred alternative, the Council noted that IPHC action is required in order for the recommendation under Alternative 2, Element 4 to be implemented. The next opportunity for the IPHC to consider halibut retention in GOA sablefish pots is at its annual meeting in January 2016. NMFS has developed draft regulatory language that would implement the preferred alternative with or without Element 4, depending on whether or not the IPHC approves pot longline as legal gear for halibut in the GOA. This RIR reflects that the Council recommends allowing the retention of incidentally caught halibut in sablefish pot longline gear, because it would avoid the creation of additional regulatory halibut discards.

4.4 Methodology for Analysis of Impacts

The evaluation of impacts in this analysis is designed to meet the requirement of E.O. 12866, which dictates that an RIR evaluate the costs and benefits of the alternatives, to include both quantifiable and qualitative considerations. Additionally, the analysis should provide information that allows decision makers "to maximize net benefits (including potential economic, environment, public health and safety, and other advantages; distributive impacts; and equity), unless a statute requires another regulatory approach." The costs and benefits of this action with respect to these attributes are described in the sections that follow, comparing Alternative 1 ("no action") with Alternative 2 and the preferred alternative (sub-set of Alternative 2). The analysts then provide a qualitative assessment of the preferred alternative's net benefit to the Nation, using the no action alternative as the baseline.

This analysis was prepared using data from the NMFS Catch Accounting System (CAS) and Restricted Access Management Program databases, which are the best available data to estimate total catch in the GOA sablefish IFQ fisheries. Total catch estimates are generated from information provided through a variety of required industry reports of harvest and at-sea discards, and data collected through an extensive fishery Observer Program. In 2003, NMFS changed the methodologies used to determine catch estimates from the NMFS blend database (1995 through 2002) to the catch accounting system (2003 through the present).

CAS was implemented to better meet the increasing information needs of fisheries scientists and managers. Currently, CAS relies on data derived from a mixture of production and observer reports as the basis of the total catch estimates. The 2003 modifications in catch estimation included providing more frequent data summaries at finer spatial and fleet resolution, and the increased use of observer data. Redesigned Observer Program data collections were implemented in 2008, and include recording sample-specific information in lieu of pooled information, increased use of systematic sampling over simple random and opportunistic sampling, and decreased reliance on observer computations. As a result of these modifications, NMFS is unable to recreate blend database estimates for total catch and retained catch after 2002. Therefore, NMFS is not able to reliably compare historical data from the blend database to the current catch accounting system.

This document focuses on data from the 2009 through 2013 fishing years (inclusive), as those five years represent the most recent range of data that was collected and reported in a generally consistent manner, and available when work on this analysis commenced. After initial review, data from 2014 was added where it was applicable and available. Revenue data are finalized during the calendar year following the fishery, so revenues for 2014 were not available for the public review draft release in March 2015.

In many instances, the description of the GOA sablefish fisheries (Section 4.5) breaks the fleet into subcategories based on vessel length (LOA) at 40 feet and under, 41 feet to 50feet, 51feet to 60 feet, and over 60 feet. At initial review, the Council was considering exemptions from a gear retrieval requirement based on these inflection points. That particular option was not retained as part of the action alternative (Alternative 2). The analysts determined that vessel length, while not a perfect predictor of ability to deploy pot longline gear, is still an important aspect of the fleet to consider in a variety of contexts. As a result, historical fishery participation and harvest data are still presented with length subcategories throughout the background sections of the RIR.

4.5 Description of GOA Sablefish Fisheries

This section provides background information on participation, vessel size, harvest, and revenues in sablefish fisheries. Most information is focused on the most recent five years of available data, but some longer term information is pulled from the sablefish chapter of the GOA SAFE Report (Hanselman et al. 2013). Most historical information describes the IFQ sablefish fishery in GOA management areas, as that is the area that would be regulated by this considered action. Limited information on other sablefish fisheries is presented to better describe dependency on the resource. Other sablefish fisheries include IFQ and CDQ fishing in the BSAI, and retention of sablefish during trawl fishing. Pot gear, in both single pot and longline configurations, are permitted in BSAI non-trawl sablefish fisheries.

4.5.1 Fishery History

The following summary of the GOA sablefish fishery is excerpted from the 2013 GOA SAFE Report, beginning at page 271.[15]

4.5.1.1 Early U.S. fishery, 1957 and earlier

Sablefish have been exploited since the end of the 19th century by U.S. and Canadian fishermen. The North American fishery on sablefish developed as a secondary activity of the halibut fishery of the United States and Canada. Initial fishing grounds were off Washington and British Columbia and then spread to Oregon, California, and Alaska during the 1920's. Until 1957, the sablefish fishery was exclusively a U.S. and Canadian fishery, ranging from off northern California northward to Kodiak Island in the GOA; catches were relatively small, averaging 1,666 t from 1930 to 1957, and generally limited to areas near fishing ports.

4.5.1.2 Foreign fisheries, 1958 to 1987

Japanese longliners began operations in the eastern BS in 1958. The fishery expanded rapidly in this area and catches peaked at 25,989 t in 1962. As the fishing grounds in the eastern BS were preempted by expanding Japanese trawl fisheries, the Japanese longline fleet expanded to the AI region and the GOA. In the GOA, sablefish catches increased rapidly as the Japanese longline fishery expanded, peaking at 36,776 t overall in 1972. Catches in the AI region remained at low levels with Japan harvesting the largest portion of the sablefish catch. Most sablefish harvests were taken from the eastern BS until 1968, and then from the GOA until 1977. Heavy fishing by foreign vessels during the 1970's led to a substantial

[15] Hanselman et al., available at http://www.afsc.noaa.gov/REFM/Docs/2013/GOAsablefish.pdf.

population decline and fishery regulations in Alaska, which sharply reduced catches. Catch in the late 1970's was restricted to about one-fifth of the peak catch in 1972, due to the passage of the Magnuson-Stevens Act (MSA).

Japanese trawlers caught sablefish mostly as bycatch in fisheries targeting other species. In the BS, the trawlers were mainly targeting rockfish, Greenland turbot, and Pacific cod. In the GOA, sablefish were mainly caught as bycatch in the directed Pacific Ocean perch fishery until 1972, when some vessels started targeting sablefish.

Other foreign nations besides Japan also caught sablefish. Substantial Soviet Union catches were reported from 1967 through 1973 in the BS. Substantial Korean catches were reported from 1974 through 1983 scattered throughout Alaska. Other countries reporting minor sablefish catches were Republic of Poland, Taiwan, Mexico, Bulgaria, Federal Republic of Germany, and Portugal. The Soviet gear was factory-type stern trawl and the Korean gears were longlines and pots.

4.5.1.3 Recent U.S. fishery, 1977 to present

The U.S. HAL longline fishery began expanding in 1982 in the GOA, and by 1988, the U.S. harvested nearly all sablefish taken in Alaska, excepting minor joint venture catches. Following domestication of the fishery, the previously year-round season in the GOA began to shorten in 1984 from 12 months in 1983 to 10 days in 1994, warranting the label “derby fishery”.

In 1995, an IFQ Program was implemented for hook-and-line vessels along with an 8-month season. The IFQ Program is a catch share fishery that issued quota shares to individuals based on sablefish and halibut landings made from 1988 through 1990. Since the implementation of IFQ’s, the number of longline vessels with sablefish IFQ harvests has experienced a substantial decline from 616 in 1995, to 362 in 2011. This decrease was expected, as shareholders consolidated their holdings and fish from fewer vessels to reduce costs. The sablefish fishery has historically been a small boat fishery; the median vessel length in the 2011 fishery was 56 feet. In recent years, approximately 30 percent of vessels eligible to fish in the IFQ fishery participate in both the halibut and sablefish fisheries, and approximately 40 percent of vessels fish in more than one management area. The season dates have varied by several weeks since 1995, but the monthly pattern has been from March to November with the majority of landings occurring between May and June.

While pot fishing in the IFQ fishery is not allowed in the GOA, it is legal in the BSAI. In 2000, the pot fishery accounted for less than 10 percent of the fixed gear sablefish catch in those areas, but effort has increased substantially in response to killer whale depredation. Since 2004, pot gear has accounted for over 50 percent of the BS fixed gear IFQ catch and up to 34 percent of the catch in the AI.

Sablefish are also caught incidentally during directed trawl fisheries for other species groups such as rockfish and deep water flatfish. Allocation of the sablefish TAC by gear group varies by management region and influences the amount of catch in each region. Five State of Alaska fisheries land sablefish outside of the IFQ Program. The major State fisheries that encounter sablefish occur in the Prince William Sound, Chatham Strait, and Clarence Strait; the minor fisheries occur in the northern GOA and AI. The minor state fisheries were established by the State of Alaska in 1995, the same time as the Federal Government established the IFQ fishery, primarily to provide open-access fisheries to fishermen who could not participate in the IFQ fishery.

IFQ management has increased fishery catch rates and decreased the harvest of immature fish. Catching efficiency (the average catch rate per hook for sablefish) increased 1.8 times with the change from an open-access to an IFQ fishery. The improved catching efficiency of the IFQ fishery reduced variable costs

from eight to five percent of landed value, a savings averaging $3.1 million annually. Decreased harvest of immature fish improved the chance that individual fish will reproduce at least once. Thus, the stock can provide a greater yield at the same target fishing rate under the IFQ fishery selectivity.

Longline gear in Alaska is fished on-bottom. In the 1996 directed fishery for sablefish, average set length was 9 km and average hook spacing was 1.2 m. The gear is baited by hand or by machine, with smaller boats generally baiting by hand and larger boats generally baiting by machine. Circle hooks usually are used, except for modified J-hooks on some boats with machine baiters. The gear is usually deployed from the vessel stern with the vessel traveling at 5-7 knots. Some vessels attach weights to the longline, especially on rough or steep bottom, so that the longline stays in place on bottom.

Pot fishing for sablefish has increased in the BS and AI as a response to depredation of longline catches by killer whales (Table 20 in Section 4.5.4). Pots are longlined with approximately 40 pots to 135 pots per set.

4.5.2 Vessel Counts and Vessel Size Groups

Across all areas (BSAI and GOA), 451 unique vessels have harvested sablefish IFQ since 2009 (Table 12). During the analyzed time period (2009 through 2013), the GOA sablefish IFQ fishery has been prosecuted by over 400 vessels. The vast majority of those vessels deliver to shoreside processing plants (Table 13). Sixteen unique catcher/processor vessels fished sablefish IFQ in the GOA since 2009.

A relatively small number of vessels have harvested sablefish IFQ with pot gear in the BS and AI areas. From 2009 through 2013, 15 unique vessels deployed sablefish pots for IFQ in the BS or AI. As many as 10 vessels did so in 2009, and as few as four did so in 2013. Use of pots was greater in the BS area (between four and nine vessels in a given year), compared to the AI area (between one and four vessels in a given year). Aside from two vessels of between 51 feet and 60 feet in length overall (LOA) that fished in the BS area in 2009, all sablefish IFQ fishing with pot gear occurred on vessels greater than 60 feet LOA. Instances of a vessel using both HAL and pot gear to fish sablefish IFQ during the same year were rare; three vessels used both gear types in 2011 (BS and AI), and two vessels used both gear types in 2012 (BS only).

Of the 404 CVs that fished GOA sablefish IFQ from 2009 through 2013, 38 fished Pacific cod with pot gear in the GOA, and 13 fished Pacific cod with pot gear in the BSAI. In all, 40 unique CVs that fished GOA sablefish IFQ from 2009 through 2013 are also using pots in another fishery. Of those 40 vessels, six are greater than 60 feet LOA, 32 are between 51 feet and 60 feet LOA, and two are between 41 feet and 50 feet LOA.

Figure 26 shows the distribution of the vessel sizes used to harvest sablefish IFQ in 2013; size classes are delineated at 40 feet, 50 feet, and 60 feet LOA. In each GOA management area, the largest proportion of sablefish IFQ vessels falls into the 51 feet to 60 feet LOA category. The WGOA has a comparatively small fleet that consists mainly of vessels in the larger length categories. The CGOA and SEO areas show the most participation by vessels 50 feet LOA or smaller. Table 14 shows the consistent distribution of vessel sizes harvesting sablefish IFQ in each GOA area over time. Both CPs and CVs are included in Table 14; only one CP (represented in each year of Table 13) was less than 60 feet LOA.

Table 12 Sablefish hook-and-line vessel participation, by management area and year

YEAR	AREA	Vessel Count		
		CDQ	IFQ	TOTAL
2009	AI	6	31	33
	BS	5	32	34
	WG		61	61
	CG		176	176
	WY		115	115
	SE		208	208
2009 Total Vessels		10	350	354
2010	AI	5	37	37
	BS	1	36	37
	WG		65	65
	CG		172	172
	WY		116	116
	SE		213	213
2010 Total Vessels		5	360	360
2011	AI	8	34	36
	BS	2	42	44
	WG		64	64
	CG		171	171
	WY		112	112
	SE		203	203
2011 Total Vessels		10	353	354
2012	AI	5	27	29
	BS	1	35	36
	WG		62	62
	CG		178	178
	WY		113	113
	SE		201	201
2012 Total Vessels		6	349	351
2013	AI	5	27	27
	BS	1	29	30
	WG	1	55	56
	CG		170	170
	WY		109	109
	SE		183	183
2013 Total Vessels		6	320	321
TOTAL VESSELS		22	451	453

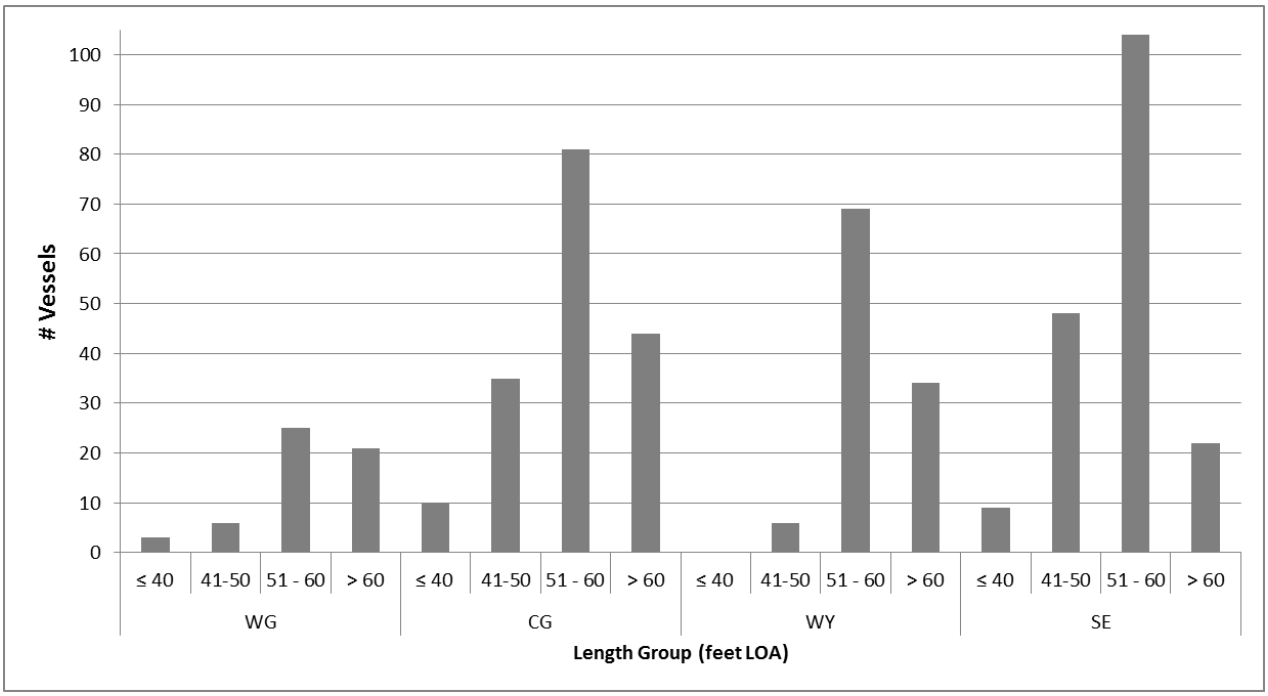
Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT.

Table 13 GOA Sablefish IFQ vessel participation, by year and by harvest sector

Year	Vessel Count	
	CV	CP
2009	323	11
2010	328	9
2011	320	8
2012	322	7
2013	304	5

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

Figure 27 Size (LOA) distribution of vessels harvesting sablefish IFQ (by area of catch), 2013



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

Table 14 Number of vessels by size category catching sablefish IFQ in each GOA management area, 2009 through 2013

LENGTH	AREA	YEAR	Vessel Count	LENGTH	AREA	YEAR	Vessel Count
≤ 40	WG	2009	2	**51 - 60**	WG	2009	30
		2010	2			2010	30
		2011	1			2011	30
		2012	2			2012	26
		2013	3			2013	25
	CG	2009	7		CG	2009	84
		2010	7			2010	86
		2011	8			2011	81
		2012	6			2012	87
		2013	10			2013	81
	WY	2009	-		WY	2009	70
		2010	-			2010	71
		2011	-			2011	69
		2012	-			2012	70
		2013	-			2013	69
	SE	2009	11		SE	2009	104
		2010	11			2010	109
		2011	10			2011	108
		2012	12			2012	112
		2013	9			2013	104
41 - 50	WG	2009	4	**> 60**	WG	2009	25
		2010	5			2010	28
		2011	7			2011	26
		2012	10			2012	24
		2013	6			2013	21
	CG	2009	29		CG	2009	56
		2010	27			2010	52
		2011	33			2011	49
		2012	36			2012	49
		2013	35			2013	44
	WY	2009	6		WY	2009	39
		2010	8			2010	37
		2011	6			2011	37
		2012	8			2012	35
		2013	6			2013	34
	SE	2009	61		SE	2009	32
		2010	64			2010	29
		2011	59			2011	26
		2012	52			2012	25
		2013	48			2013	22

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

4.5.3 Homeports and Delivery Locations

Vessels that landed IFQ sablefish from 2009 through 2013 were homeported in 49 different communities, 30 of which are located in Alaska (homeport is self-reported to CFEC). Catcher vessels made shoreside deliveries to 29 communities, 27 of which are in Alaska. For both Table 15 and Table 16, **asterisks** indicate that IFQ harvested by those vessels or delivered to those communities was entirely caught in the BSAI areas.

Roughly 95 percent of the vessels in the smaller length groups (less than or equal to 50 feet LOA) report their homeport in an Alaska community. Eighty-five percent of vessels in the 51 foot to 60 foot LOA group homeported in Alaska. By comparison, over half of the sablefish IFQ vessels that are greater than 60 feet LOA (54 percent) homeport outside of Alaska. The vast majority of sablefish IFQ deliveries were made to Alaska ports. Larger vessels were more likely to deliver to Bellingham, WA, Seattle, WA, or Warrenton, OR. However, since 2009 only 14 vessels made deliveries outside of Alaska, and zero vessels delivered exclusively to a non-Alaskan community.

Table 15 Homeport communities for vessels making sablefish IFQ landings, 2009 through 2013

AK (30)		WA (10)	OR (6)	CA (3)
Adak	Ketchikan	Anacortes	Astoria	Fort Bragg
Anchor Point	King Salmon	Everett	Brookings	San Francisco
Atka*	Kodiak	Gig Harbor	Newport	Ventura
Cordova	Nikolaevsk	Hat Island	Portland	
Craig	Pelican	Ilwaco	Reedsport	
Douglas	Petersburg	Mt. Vernon	Winchester Bay	
Dutch Harbor	Port Alexander	Port Angeles		
Egegik	Port Lions*	Port Orchard		
Elfin Cove	Sand Point	Port Townsend		
False Pass*	Seldovia	Seattle		
Gustavus	Seward			
Haines	Sitka			
Homer	St. Paul Island*			
Hoonah	Unalaska*			
Juneau	Wrangell			

* Vessels from these communities only harvested sablefish IFQ in BSAI.
Source: NMFS Alaska Region RAM (Restricted Access Management) data provided by AKFIN.

Table 16 Ports of delivery for sablefish IFQ, 2009 through 2013

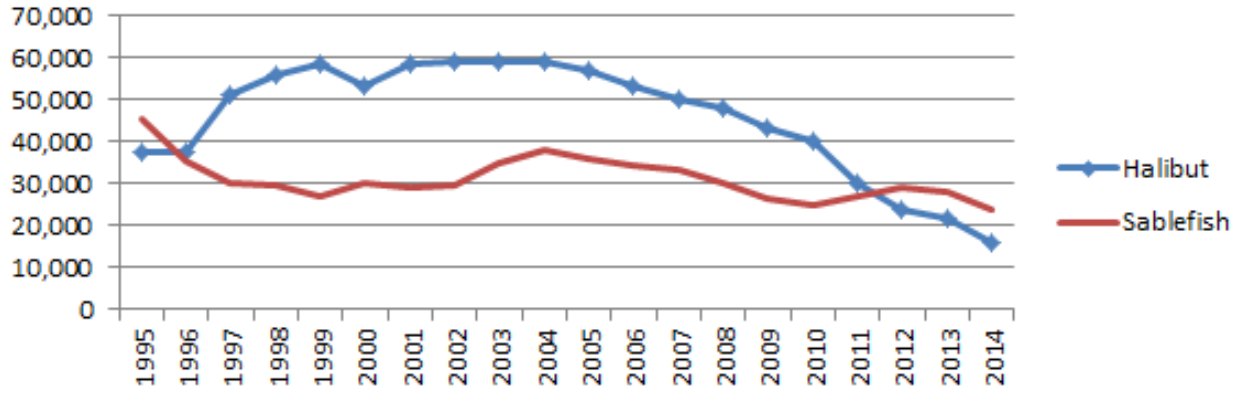
Adak*	King Cove
Akutan	Kodiak
Alitak	Petersburg
Atka*	Port Alexander
Bellingham (WA)	Sand Point
Cordova	Seattle (WA)*
Craig	Seward
Dutch/Unalaska	Sitka
Elfin Cove	St. Paul*
Excursion Inlet	Valdez
False Pass	Warrenton (OR)
Homer	Whittier
Hoonah	Wrangell
Juneau	Yakutat
Ketchikan	

* Deliveries to these communities consisted only of sablefish IFQ harvested in BSAI.
Source: NMFS Alaska Region RAM (Restricted Access Management) data provided by AKFIN.

4.5.4 Harvests

Figure 27 shows the fluctuation of IFQ TACs since 1995. Total annual IFQ TAC is the entire IFQ allocation for all areas. The vertical axis shows halibut TACs in thousands of net pounds (head off-gutted), and shows sablefish TACs in thousands of round pounds. Table 17 shows the allocation of available 2014 sablefish IFQ harvest by area; CDQ groups are allocated 20 percent of the BS and AI fixed-gear harvest.

Figure 28 Annual IFQ TACS in thousands of pounds, 1995 through 2014



Source: NMFS RAM, Pacific Halibut-Sablefish IFQ Report, 2012 (NMFS, 2013).

Table 17 2014 allocation of sablefish TAC by area

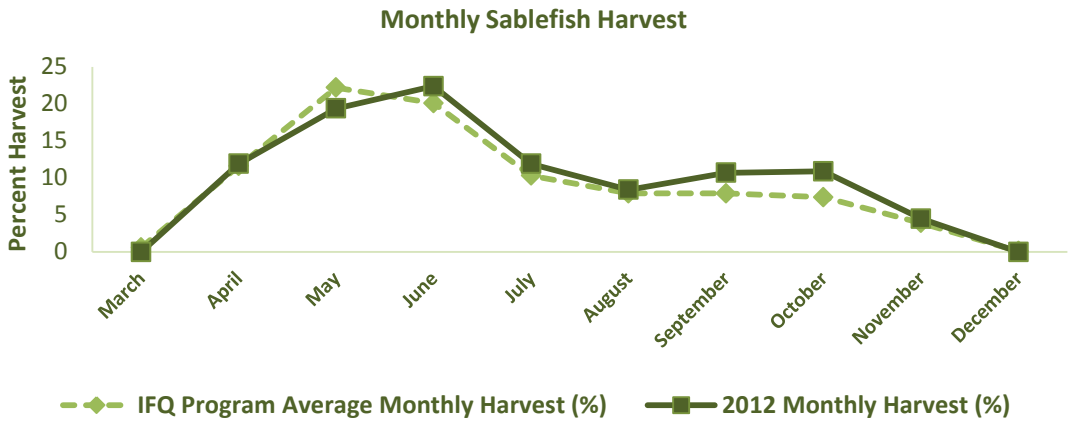
2014 Sablefish IFQ Allocations								
Sablefish Area	TAC (mt)*	Fixed Gear Allocation (mt)	% IFQ	IFQ Allocaiton (mt)	IFQ Allocation (lbs.)	% CDQ	CDQ Allocaiton (mt)	CDQ Allocation (lbs.)
SE	2,695	2,695	100%	2,695	5,941,397	0%		
WY	1,716	1,495	100%	1,495	3,295,877	0%		
CG	4,681	3,745	100%	3,745	8,256,227	0%		
WG	1,480	1,184	100%	1,184	2,610,246	0%		
All GOA	**10,572**	**9,119**		**9,119**	**20,103,747**			
AI	1,811	1,358	80%	1,086	2,394,196	20%	272	599,651
BS	1,339	670	80%	536	1,181,666	20%	134	295,416
All BSAI	**3,150**	**2,028**		**1,622**	**3,575,861**		**406**	**895,068**
TOTAL	**13,722**	**11,147**		**10,741**	**23,679,609**			

Source: NMFS RAM;
* TAC includes incidental catch allocation for trawl sectors in areas other than Southeast Outside.
Notes: All figures in round weight. For BS and AI areas, 20 percent of the fixed-gear TAC is reserved for use by CDQ participants.

Sablefish TACs are typically harvested at or near the limit in GOA areas. During 2013 and 2014, the WGOA IFQ fleet caught 92 percent and 94 percent of the TAC, respectively. At least 97 percent of the TAC was taken in all other GOA areas during those two most recent years. Between 36 percent and 57 percent of the BS and AI sablefish TACs were caught during 2013 and 2014, while BSAI halibut TACs (IPHC Area 4) were harvested in the 85 percent to 97 percent range. The latter comparison would indicate that BSAI sablefish is a secondary fishery for the IFQ fleet, whereas sablefish is no less fully prosecuted than halibut in the GOA. Many fishermen target both sablefish and halibut on the same fishing trip. In 2014, 6,044 IFQ landings occurred throughout the GOA and BSAI areas; 1,014 of those vessel offloads (17 percent) contained both IFQ species.

Figure 28 shows that the pattern and rate of IFQ sablefish harvest by month for the IFQ fishing years dating back to 1995. The monthly pattern has been consistent throughout the program, even though season dates have varied. Monthly harvest, as a percentage of the year's total annual catch, peaks in the spring, and falls off during the summer months when many IFQ vessels are participating in directed salmon fisheries. Smaller vessels also tend to focus their halibut IFQ effort on the summer months.

Figure 29 2012 monthly sablefish harvest (%) compared to average monthly IFQ sablefish harvest (1995–2012)



Source: NMFS RAM, Pacific Halibut-Sablefish IFQ Report, 2012 (NMFS, 2013).

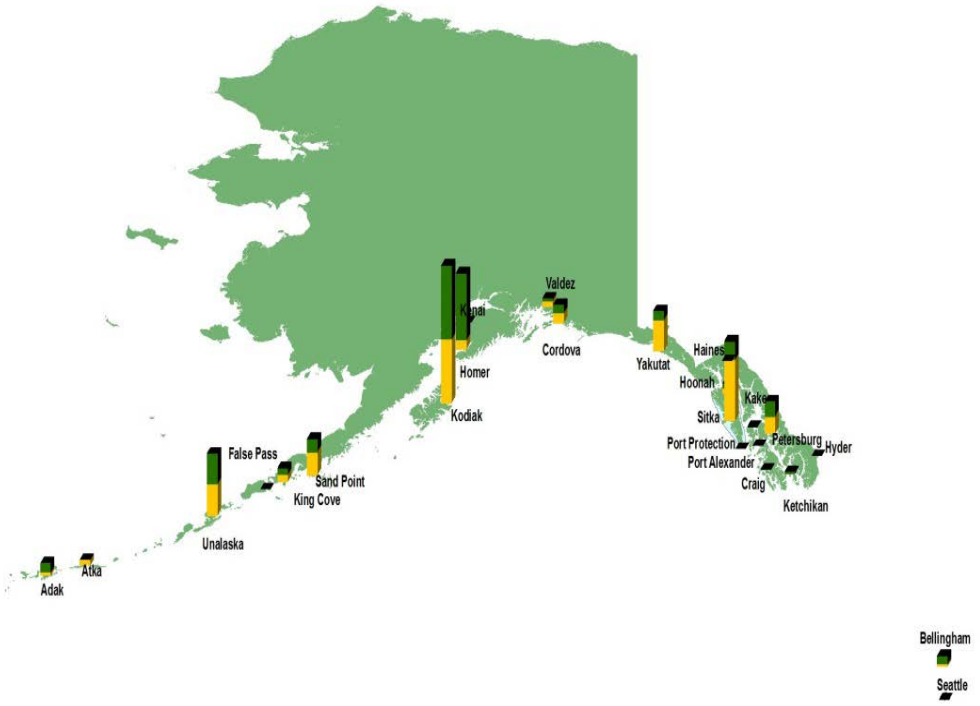
Table 18 shows the distribution of sablefish IFQ catch taken by CVs in GOA management areas and delivered to shoreside processing plants in different communities. Delivery ports are listed in descending order of aggregate sablefish receipts. The data in Table 18 aggregates the years 2009 through 2013. Over that period, the largest amount of GOA sablefish IFQ was caught in the CGOA. Nearly half of the sablefish IFQ catch taken in the WGOA was delivered to Sand Point. Around three-quarters of the sablefish IFQ catch taken in the CGOA was delivered to either Seward or Kodiak. Over 60 percent of sablefish IFQ catch taken in the WY district was delivered to either Yakutat or Seward. Roughly 56 percent of sablefish IFQ catch taken in the SEO was delivered to Sitka.

Table 18 Proportion of total CV GOA sablefish IFQ catch delivered to each community (by location of harvest activity), 2009 through 2013

	Area of Sablefish IFQ Catch				% GOA Total
Delivery Port	**WG**	**CG**	**WY**	**SE**	
SEWARD	0.01%	16.93%	4.01%	0.17%	21.12%
SITKA		0.21%	1.15%	17.30%	18.66%
KODIAK	1.42%	13.50%	1.23%	0.16%	16.32%
YAKUTAT	C	0.29%	7.01%	1.18%	*
SAND POINT	5.57%	0.83%			6.40%
JUNEAU		0.08%	0.48%	5.16%	5.72%
HOMER	0.32%	4.41%	0.21%		4.94%
CORDOVA	C	2.18%	2.62%	0.04%	*
PETERSBURG		0.04%	0.11%	4.20%	4.35%
KING COVE	2.24%	0.18%			2.42%
VALDEZ		1.43%	0.26%	C	*
HOONAH		C	0.23%	1.39%	*
AKUTAN	1.26%	0.04%			1.30%
WRANGELL		C	0.01%	0.66%	*
DUTCH/UNALASKA	0.53%	0.01%			0.54%
ALITAK	C	0.30%			*
KETCHIKAN			C	0.24%	*
BELLINGHAM		0.02%	0.08%	0.02%	0.12%
EXCURSION INLET			C	C	C
FALSE PASS	0.07%				0.07%
CRAIG				0.05%	0.05%
ELFIN COVE				C	C
PORT ALEXANDER				C	C
WARRENTON		C			C
WHITTIER		C			C
Total	11.45%	40.48%	17.45%	30.62%	100.00%

Note: 'C' indicates confidential data; * denotes data that is redacted in order to preserve confidentiality of other fields.
Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT.

Figure 30 2012 landings for IFQ halibut and sablefish by port. (Green = halibut; Yellow = sablefish)



Source: NMFS RAM, Pacific Halibut-Sablefish IFQ Report, 2012 (NMFS, 2013).

Table 19 shows sablefish IFQ catch in round pounds, broken out by year (2009 through 2013), vessel size group, and area of catch. The vessel size groups are delineated at 40 feet, 50 feet, and 60 feet LOA[16]. Vessels in the 51 foot to 60 foot LOA category recorded the largest amount of catch across all areas in each year. Vessels greater than 60 foot LOA landed the second most sablefish IFQ in each year. In the SEO district, the amount of sablefish landed by vessels over 60 feet was not far behind vessels in the 41 foot to 50 foot vessel size group despite the larger vessels being a small fleet in number of platforms (see Figure 26 and/or Table 14). Small vessels (less than or equal to 40 feet LOA) harvested a relatively small percentage of total annual catch; their participation as a percentage of a GOA area's annual catch was greatest in the SEO district.

[16] As noted in Section 4.4, the Council had previously considered a requirement that pot longline gear be removed from the fishing grounds when making a landing, and had asked staff to consider length-based exemptions for vessel under a certain size (LOA). That option is no long under consideration, as length was determined to be a poor proxy for a vessel's ability to transport pots safely, and because it created an arbitrarily distributed set of competitive advantages for certain vessels. However, the 40 foot, 50 foot, and 60 foot break-points are still used in the background portion of the RIR analysis since they provide another informative metric of diversity within the GOA sablefish fishery.

Table 19 Sablefish IFQ catch (pounds) by year, vessel size group, and area of catch (2009 through 2013)

Year	Length	BS	AI	WG	CG	WY	SE	Grand Total
2009	≤ 40	100,982		42,729	35,496		154,126	333,333
	41 - 50	31,324	5,194	68,163	440,738	60,243	1,205,072	1,810,734
	51 - 60	202,096	345,165	1,360,153	4,348,552	1,729,929	3,476,157	11,462,052
	> 60	1,152,643	1,307,444	1,357,435	3,903,284	1,615,284	1,226,152	10,562,242
2009 Total		**1,487,045**	**1,657,803**	**2,828,480**	**8,728,070**	**3,405,456**	**6,061,507**	**24,168,361**
2010	≤ 40	161,081		37,756	85,800	4,332	163,263	452,232
	41 - 50	28,114	9,114	59,273	431,196	127,176	1,203,052	1,857,925
	51 - 60	163,499	267,573	1,391,333	4,051,513	1,560,407	3,220,920	10,655,245
	> 60	729,053	1,137,744	1,282,284	3,352,194	1,401,524	1,059,299	8,962,098
2010 Total		**1,081,747**	**1,414,431**	**2,770,646**	**7,920,703**	**3,093,439**	**5,646,534**	**21,927,500**
2011	≤ 40	120,949		10,393	43,618		138,492	313,452
	41 - 50	42,931	1,498	120,701	436,912	149,146	1,397,692	2,148,880
	51 - 60	267,661	353,795	1,433,297	4,422,601	1,922,343	3,779,731	12,179,428
	> 60	622,319	1,328,680	1,183,365	3,363,243	1,753,184	1,118,347	9,369,138
2011 Total		**1,053,860**	**1,683,973**	**2,747,756**	**8,266,374**	**3,824,673**	**6,434,262**	**24,010,898**
2012	≤ 40	164,801	0	94,982	57,766	4,255	169,382	491,186
	41 - 50	48,098	10,904	251,112	605,413	149,160	1,425,042	2,489,729
	51 - 60	125,235	410,434	1,459,198	5,273,129	2,180,832	4,132,362	13,581,190
	> 60	721,489	1,384,166	1,000,176	3,818,963	1,899,159	1,139,230	9,963,183
2012 Total		**1,059,623**	**1,805,504**	**2,805,468**	**9,755,271**	**4,233,406**	**6,866,016**	**26,525,288**
2013	≤ 40	114,234		220,182	100,817	3,058	141,052	579,343
	41 - 50	41,434	6,322	145,444	630,198	128,472	1,442,541	2,394,411
	51 - 60	105,792	286,984	1,512,093	5,125,023	2,094,989	4,212,556	13,337,437
	> 60	536,458	1,317,433	969,220	3,580,459	1,664,395	1,068,250	9,136,215
2013 Total		**797,918**	**1,610,739**	**2,846,939**	**9,436,497**	**3,890,914**	**6,864,399**	**25,447,406**

Source: NMFS Alaska Region RAM (Restricted Access Management) data provided by AKFIN.

Figure 30 illustrates catch of sablefish by gear type for the GOA. The figure, taken from the 2014 GOA Groundfish SAFE Report (p.347) shows that fixed gear IFQ fishing makes up that majority of sablefish catch. A small portion of the overall GOA sablefish TAC is allocated to the trawl sector for incidental catch, which can be retained up to maximum retainable amounts (MRAs) as defined in regulation at Table 10 to Part 679.[17] Depending upon the basis species that is being targeted on a given trip, the MRA for sablefish in the GOA is 1 percent or 7 percent. The higher sablefish MRAs are set for directed fishing for flathead sole, rex sole, and rockfish.

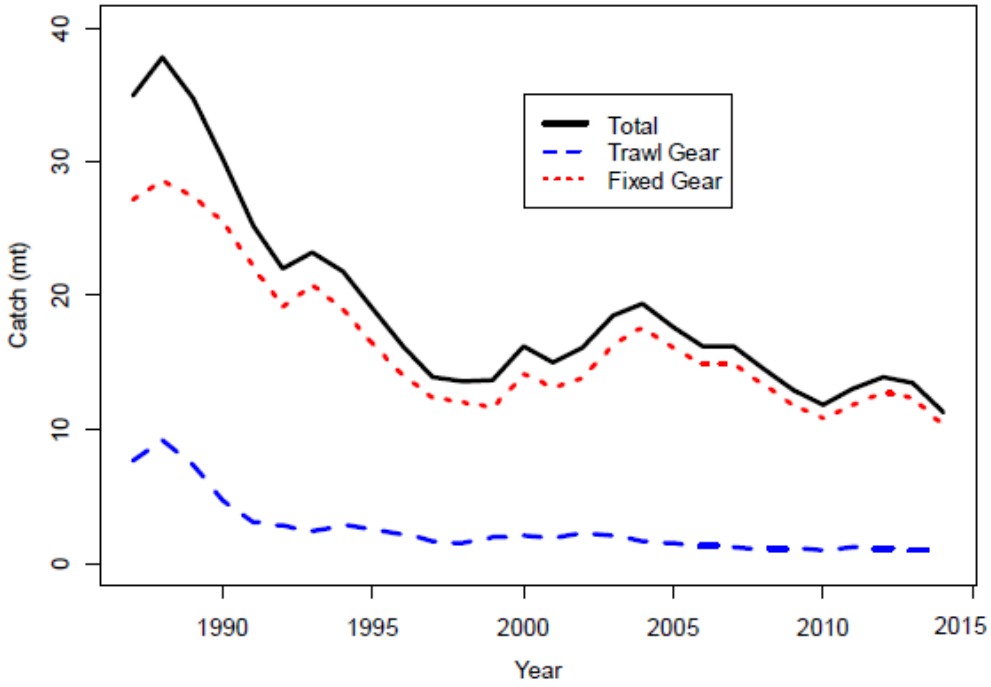
Table 20 provides sablefish catch information by gear type in the BS and AI areas. While not included in the regulated area for this action, BSAI gear information is included because it shows that pots can be a viable gear type for sablefish harvest. It should be noted, however, that BSAI fisheries may be prosecuted by larger vessels on average and that the bottom structure or target fishing depths may differ from some of the relevant GOA areas, particularly SEO.

Table 20 contains all sablefish catch, and is not limited to IFQ fisheries. Since 2004, sablefish harvest with pot gear has overtaken longline (HAL) sablefish harvest in the BS, while HAL gear remains the predominant mode in AI. The same relationship between gear types holds true for BSAI sablefish harvests when looking only at IFQ catch. Five-year averages for 2009 through 2013 indicate that 87 percent of AI IFQ sablefish was taken with HAL gear, compared to 13 percent taken with pot gear. In the BS area, 35 percent of IFQ sablefish was taken with HAL gear and 65 percent was taken with pot gear. A table specific to IFQ catch is not shown in order to preserve confidentiality in the AI area where a

[17] See "Gulf of Alaska Retainable Percentages" at http://alaskafisheries.noaa.gov/rr/tables/tabl10.pdf.

confidential number of vessels fished pot gear in some years. It is not possible to differentiate between single and longline pots in the BSAI data, as both are reported under the same gear code.

Figure 31 Sablefish catch by gear type (Figure 3.1 from the 2014 GOA Groundfish SAFE Report, p.347)



Source: Hanselman et al., in NPFMC 2014.

Table 20 Sablefish catch (mt) in the Bering Sea and Aleutian Islands areas by gear type. Both CDQ and non-CDQ catches are included. 2013 catch as of October 24, 2014

Aleutian Islands				
Year	Pot	Trawl	HAL Longline	Total
1991-1999	6	73	1,210	1,289
2000	103	33	913	1,049
2001	111	39	925	1,074
2002	105	39	975	1,119
2003	316	42	760	1,118
2004	384	32	539	955
2005	688	115	679	1,481
2006	461	60	629	1,151
2007	632	40	496	1,168
2008	179	76	646	901
2009	78	75	947	1,100
2010	59	74	961	1,094
2011	141	47	836	1,024
2012	77	148	979	1,205
2013	87	58	917	1,062
Bering Sea				
1991-1999	5	189	539	733
2000	40	283	418	741
2001	106	336	405	847
2002	382	268	467	1,117
2003	363	183	417	964
2004	435	276	313	1,024
2005	595	262	202	1,059
2006	621	76	373	1,070
2007	879	80	211	1,170
2008	754	181	204	1,139
2009	557	91	266	914
2010	452	30	274	755
2011	405	44	256	705
2012	432	93	218	743
2013	352	133	149	634

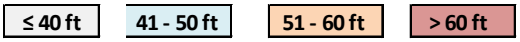
Note: 1991 through 1999 catch shows an annual average.
Source: Table 3.2 in GOA Groundfish SAFE Report (p.329), Hanselman et al., in NPFMC 2014.

Figure 31 breaks down the 2013 harvest of sablefish IFQ by GOA CVs along several dimensions. Each of the five panels can be interpreted in the same manner. By way of example, the top panel for "All GOA" breaks down the total CV catch of GOA sablefish IFQ (in pounds) by placing each vessel into a quartile based on the portion of the total 2013 CV GOA sablefish IFQ taken by that vessel. Since 302 CVs recorded IFQ landings, roughly 75 vessels are in each quartile. The 75 vessels that caught the fewest sablefish are in Quartile 1 (1^{st} to 25^{th} percentile). The 75 vessels that caught the most sablefish are in Quartile 4 (76^{th} to 99^{th} percentile). Looking at Quartile 1, the length of each shaded bar (color coded by vessel length group) indicates the share of the total catch in that quartile taken by vessels in that length group, in aggregate. For example, around 30 percent of the catch taken by all Quartile 1 vessels in aggregate (totaling 313,275 lbs.) was caught on vessels less than or equal to 40 feet LOA. Each shaded bar is labeled with the number of vessels in that size group that contributed to the catch in that quartile. In short, the length of the shaded bar should be read as 'pounds', and is not necessarily linked to the number

of vessels labeled on the bar. The graphical illustration in Figure 31 is intentionally coarse in order to preserve confidentiality where the activity of three or fewer vessels is represented by a shaded bar.

Figure 31 illustrates the following facts about GOA CV sablefish IFQ catch in 2013. Overall, vessel size and total harvest seem to be correlated, as small vessels are most represented in the lowest producing quartile (Quartile 1) and large vessels are most represented in the highest producing quartile (Quartile 4). That said, some smaller vessels were among the higher producing vessels in their area, and some large vessels produced in the lower quartile. Vessels in small size categories were more likely to be in the highest producing quartile in the SEO. Small vessel participation is most prevalent in CGOA and SEO. Vessels in the 51 foot to 60 foot LOA category account for the greatest amount of production, and tend to be the most numerous in each production quartile.

Figure 32 2013 GOA CV sablefish IFQ catch by harvest-per-vessel quartile, reporting the percentage of each catch quartile by vessel length group and the number of vessels of each length group in each quartile



All GOA	Cumulative Percent of Catch in Each Quartile				
	0% - 25%	26% - 50%	51% - 75%	76% - 100%	Total Catch (lbs.)
Quartile 1	19 vessels	35	15	7	313,275
Quartile 2	5	34	34	2	1,993,662
Quartile 3	19	48	8		5,207,044
Quartile 4	2	1 46	27		14,172,880

Western GOA	Cumulative Percent of Catch in Each Quartile				
	0% - 25%	26% - 50%	51% - 75%	76% - 100%	Total Catch (lbs.)
Quartile 1	1 ves.	3	5	4	104,055
Quartile 2	1	8	4		343,644
Quartile 3	2	6	5		645,834
Quartile 4	2	7	3		1,417,960

Central GOA	Cumulative Percent of Catch in Each Quartile				
	0% - 25%	26% - 50%	51% - 75%	76% - 100%	Total Catch (lbs.)
Quartile 1	10 vessels	14	10	7	88,770
Quartile 2	5	15	18	4	798,117
Quartile 3	3	31	8		2,552,812
Quartile 4	1	20	20		5,394,023

West Yakutat	Cumulative Percent of Catch in Each Quartile				
	0% - 25%	26% - 50%	51% - 75%	76% - 100%	Total Catch (lbs.)
Quartile 1	1 4 ves.	18		4	133,954
Quartile 2	23			4	450,002
Quartile 3	1	13	13		1,045,828
Quartile 4	1	14	11		2,074,832

Southeast	Cumulative Percent of Catch in Each Quartile				
	0% - 25%	26% - 50%	51% - 75%	76% - 100%	Total Catch (lbs.)
Quartile 1	8 vessels	25	12	1	348,316
Quartile 2	2	14	22	8	1,155,162
Quartile 3	1	11	28	6	2,098,076
Quartile 4	6	34	5		3,035,476

Data source: NMFS Alaska Region RAM (Restricted Access Management) data provided by AKFIN.

4.5.4.1 Catch Per Unit Effort

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. CPUE is derived from observer and logbook data, and is reported in the GOA Groundfish SAFE. For HAL fishing, sablefish CPUE tends to be highest in the spring when the majority of effort occurs, around 0.8 or 0.9 lbs./hook. HAL CPUE in the summer shows greater annual fluctuation, but tends to track between spring and fall levels. HAL CPUE in the fall tends to be lower, and was most recently reported around 0.6 lbs./hook. All levels are estimated from page 277 in the 2013 GOA Groundfish SAFE (Hanselman et al., NPFMC, 2014). Table 3.9 (p.315) of the GOA Groundfish SAFE provides annual estimates and standard errors for HAL CPUE by area. Separate estimates are reported for observer data and for logbook data. Estimates derived from logbook data tend to be slightly higher. During the five year period from 2008 through 2012, observer data estimates of sablefish HAL CPUE were around 0.45 lbs./hook in WGOA, around 0.80 lbs./hook in CGOA, around 1.20 lbs./hook in WY, and around 1.00 lbs./hook in SE.

The GOA Groundfish SAFE Report does not provide specific annual sablefish CPUE data for pot gear due to sparse and sometimes confidential data. The best available sablefish data are average catch rates for 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). The above estimates are taken from page 277 of the 2013 GOA Groundfish SAFE Report. These CPUE levels are not expected to be indicative of pot productivity in all GOA areas, as the BSAI likely differs in abundance, fishing depth, and environmental conditions.

4.5.4.2 Non-Target Catch in Sablefish Target Fisheries

Estimates of sablefish discards by target fisheries are available for hook-and-line gear and other gear combined (Table 21). From 1994 through 2004, discards averaged 1,357 mt for the GOA and BSAI combined. Since then, discards have been lower, averaging 626 mt from 2006 through 2011. Hook-and-line discards have been higher in the GOA than in the BSAI areas during recent years.

Table 22 shows the bycatch of GOA FMP species and halibut in the GOA sablefish HAL target fishery. Rockfish species and halibut account for the largest amounts of non-sablefish catch. Pacific cod, arrowtooth flounder, and skate species were also taken with HAL gear in notable amounts. While not a perfect analog, due to possible differences in the depth of fishing, Table 23 shows the bycatch of GOA FMP species taken with pot gear during GOA Pacific cod fishing. Note that bycatch of octopus and "other species"[18] are relatively higher, while catch of rockfish, skates, and sharks are either much lower or not reported at all.

Giant grenadiers make up the bulk of the non-target species bycatch, peaking at 9,315 mt in 2007, but since decreasing with a 2011 catch of 6,652 mt (Table 24). Other non-target catches that have totals over a ton per year are corals, snails, sponges, sea stars, and miscellaneous fishes and crabs.

Prohibited species catches (PSC) in the targeted sablefish fisheries are dominated by halibut (1,060 mt/year) and golden king crab (134,000 individuals/year). Halibut catches seem to be decreasing, while catches of golden king crab are highly variable from year to year, probably as a result of low sampling effort in BSAI sablefish pot fisheries.

[18] "Other Species" includes different shark, squid, and sculpin species that are not captured in other AKFIN species groupings.

Table 21 Discarded catches of sablefish (amount [mt], percent of total catch, total catch [mt]) by gear (HAL=hook-and-line, Other = Pot, trawl, and jig, combined for confidentiality) by FMP area for 2007 through 2012

		BSAI			GOA			Combined		
Year	Gear	Discard	%Discard	Catch	Discard	%Discard	Catch	Discard	%Discard	Catch
2007	Total	70	3.0%	2,322	420	3.3%	12,693	490	3.3%	15,015
	HAL	16	2.3%	679	242	2.1%	11,586	258	2.1%	12,265
	Other	54	3.3%	1,643	178	16.1%	1,107	232	8.4%	2,749
2008	Total	98	4.8%	2,035	810	6.4%	12,591	908	6.2%	14,626
	HAL	92	10.9%	845	737	6.3%	11,727	829	6.6%	12,573
	Other	7	0.5%	1,190	72	8.4%	864	79	3.8%	2,053
2009	Total	26	1.3%	1,986	708	6.4%	10,994	733	5.6%	12,981
	HAL	18	1.5%	1,183	627	6.2%	10,106	645	5.7%	11,289
	Other	8	1.0%	803	81	9.1%	889	89	5.2%	1,692
2010	Total	42	2.3%	1,831	415	4.1%	10,089	457	3.8%	11,920
	HAL	34	2.8%	1,215	368	4.0%	9,188	402	3.9%	10,403
	Other	8	1.3%	616	48	5.3%	901	55	3.7%	1,517
2011	Total	24	1.4%	1,714	691	4.7%	14,580	715	4.4%	16,295
	HAL	16	1.5%	1,077	493	3.7%	13,315	509	3.5%	14,392
	Other	8	1.2%	637	198	15.6%	1,265	206	10.8%	1,902
2012	Total	23	1.2%	1,938	352	3.0%	11,914	375	2.7%	13,852
	HAL	12	1.0%	1,189	287	2.6%	11,054	299	2.4%	12,243
	Other	41	5.5%	749	65	7.6%	860	76	4.7%	1,610
2007-2012	Total	47	2.4%	1,971	566	4.7%	12,144	613	4.3%	14,115
Average	HAL	31	3.0%	1,031	459	4.1%	11,163	490	4.0%	12,194
	Other	21	2.2%	940	107	10.9%	981	123	6.4%	1,921

Source: NMFS Alaska Regional Office via AKFIN, November 6, 2013.

Table 22 Bycatch of FMP groundfish species in the GOA sablefish hook-and-line fishery, cumulative from 2008 through 2013

Species Name	Retained (mt)	Discarded (mt)
GOA Thornyhead Rockfish	2,040	793
GOA Shortraker Rockfish	574	717
GOA Rougheye Rockfish	487	298
Pacific Cod	263	277
Arrowtooth Flounder	161	1,105
GOA Demersal Shelf Rockfish	63	3
Other Rockfish	59	137
GOA Skate, Longnose	38	778
GOA Skate, Other	29	795
GOA Shallow Water Flatfish	6	18
GOA Skate, Big	5	28
GOA Pelagic Shelf Rockfish	2	7
Pollock	1	9
GOA Deep Water Flatfish	1	46
GOA Dusky Rockfish	1	1
Shark	1	1,651
Other Species	< 1	289
Octopus	< 1	15
Pacific Ocean Perch	< 1	3
Northern Rockfish	< 1	< 1
Squid		< 1
Sculpin		47
GOA Rex Sole		< 1
Atka Mackerel		< 1
Flathead Sole		4

"Other Species" includes different shark, squid, and sculpin species that are not captured in other AKFIN species groupings.
Source: NMFS AKRO Blend/Catch Accounting System via AKFIN.

Table 23 Bycatch of FMP groundfish species in the GOA Pacific cod pot fishery, cumulative from 2008 through 2013

Species Name	Retained (mt)	Discarded (mt)
Octopus	850	688
Other Species	750	534
Pollock	50	44
Sculpin	10	510
Atka Mackerel	2	117
GOA Skate, Other	2	
Squid	1	
Flathead Sole	< 1	< 1
GOA Skate, Big	< 1	< 1
GOA Shallow Water Flatfish	< 1	7
GOA Pelagic Shelf Rockfish	< 1	22
Arrowtooth Flounder	< 1	27
Other Rockfish	< 1	17
Shark	< 1	1
Pacific Ocean Perch	< 1	1
GOA Dusky Rockfish	< 1	10
Northern Rockfish	< 1	7
GOA Rougheye Rockfish	< 1	1
Sablefish	< 1	18
GOA Rex Sole	< 1	
GOA Deep Water Flatfish		< 1

Source: NMFS AKRO Blend/Catch Accounting System via AKFIN.

Table 24 Bycatch/ take (mt) of non-target species and HAPC biota in the targeted sablefish fishery, 2006 through 2011

	Estimated Catch (t)					
Group Name	2006	2007	2008	2009	2010	2011
Benthic urochordata	0.08	0.00	-	0.01	0.12	0.13
Birds	0.91	1.59	0.55	0.40	0.35	1.43
Bivalves	0	Conf.	-	0	0.00	0.06
Brittle star unidentified	0.05	0.10	0.06	0.33	0.10	0.38
Corals Bryozoans	1.57	0.16	1.56	1.62	2.45	4.90
Dark Rockfish	-	-	Conf.	0	Conf.	-
Eelpouts	1.30	2.26	9.04	1.76	1.34	0.54
Eulachon	-	0	Conf.	0	Conf.	-
Giant Grenadier	4,030	9,315	8,897	5,369	4,402	6,652
Greenlings	-	76	0.02	0.02	-	0
Grenadier	4,907	109	128	961	749	810
Hermit crab unidentified	0.05	0.05	0.07	0.09	0.19	0.21
Invertebrate unidentified	0.07	0.02	0.01	0.42	0.76	1.88
Misc. crabs	0.47	1.12	0.94	3.20	1.90	1.16
Misc. crustaceans	-	-	-	2	0.00	0.00
Misc. deep fish	0	0.00	-	0	-	0
Misc. fish	18.34	17.10	21.19	4.72	4.01	7.96
Misc. inverts (worms etc.)	0	Conf.	0	0.01	0.00	0.00
Other osmerids	-	-	Conf.	-	-	-
Pandalid shrimp	0	0.00	0.00	0.01	0.00	0.00
Polychaete unidentified	-	-	0	0.00	0.00	0.00
Scypho jellies	0.10	0.00	Conf.	0	0	1
Sea anemone unidentified	0.29	3.34	0.69	1.99	1.32	3.06
Sea pens whips	0.19	0.08	0.32	0.49	0.03	1.52
Sea star	5.23	35.29	1.56	2.45	2.53	3.24
Snails	9.41	8.09	6.43	11.22	11.56	19.70
Sponge unidentified	0.71	0.16	14.65	1.92	0.76	1.99
Urchins, dollars, cucumbers	0.15	0.14	0.48	1.03	0.55	0.24

Source: Hanselman et al., in NPFMC 2014.

Table 25 Prohibited Species Catch (PSC) estimates reported in tons for halibut and herring, thousands of animals for crab and salmon, by gear, year, and fisheries management plan (BSAI or GOA) area for the sablefish fishery. Other = Pot and trawl combined because of confidentiality.

	2008			2009			2010			2011			Average
	BSAI	GOA	Total	BSAI	GOA	Total	BSAI	GOA	Total	BSAI	GOA	Total	
Hook and Line Gear													
Bairdi Crab	0.00	0.01	0.01	0.03	0.24	0.28	0.00	0.07	0.07	0.00	0.00	0.00	0.09
Golden K. Crab	0.17	0.08	0.25	0.32	0.03	0.35	0.97	0.00	0.97	0.50	0.13	0.63	0.55
Halibut	151	953	1,104	186	1,023	1,209	220	760	980	135	813	948	1,060
Other Salmon	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Opilio Crab	0.01	0.23	0.24	0.01	0.21	0.22	0.00	0.16	0.16	0.00	0.29	0.29	0.23
Red K. Crab	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.02	0.00	0.02	0.02
Other Gear													
Bairdi Crab	0.14	0.18	0.32	1.65	0.08	1.74	0.00	0.06	0.06	0.94	0.00	0.00	0.53
Golden K. Crab	182	0	182	139	0	139	26	0	26	191	0	191	134
Halibut	28	7	35	17	3	20	39	4	43	17	6	23	30
Herring	0.00	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Other Salmon	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.00
Opilio Crab	0.25	0.00	0.25	0.01	0.10	0.11	2.15	0.03	2.18	0.33	0.00	0.33	0.72
Red K. Crab	0.42	0.00	0.42	0.00	0.00	0.00	0.00	0.00	0.00	0.41	0.00	0.41	0.21

Source: NMFS AKRO Blend/Catch Accounting System PSCNQ via AKFIN, October 12, 2012.

4.5.4.3 Spatial Distribution of Sablefish Catch

While developing this action, the Council heard testimony asserting that reintroducing[19] pot longline gear to the GOA could exacerbate grounds preemption and/or gear conflict. 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.

Table 26 and Figure 32 synthesize information about where sablefish harvest occurred from 2009 through 2013, and how that compares to the location of commercial fishing activity in general. The analysts identified 209 ADF&G statistical areas in the GOA where sablefish were caught during the aforementioned time period – by any gear type, directed or incidental. Including all gear types means that the data speak to where sablefish are found, and not just where IFQ fishermen go to harvest them. Of the 209 statistical areas, the 47 areas that accounted for at least 500,000 round lbs. of sablefish harvest combined to account for 94 percent of total sablefish catch (101 million out of 107 million round lbs.). These 47 areas are referred to as "sablefish hotspots". Next, the analysts looked at the spatial distribution of "all" commercial fishing activity to see what proportion came from these key sablefish areas; for these purposes, "all" activity means "all groundfish, halibut, and crab fishing by all gear types" (salmon is excluded). Table 26 indicates that some portions of the GOA have key fishing areas that are spatially confined and that coincide with the primary sablefish areas. For example, 95 percent of all fishing activity in the West Yakutat district occurs in statistical areas that are "sablefish hotspots". By comparison, there are relatively more options for productive fishing grounds in the CGOA and WGOA. The shading in Figure 32 reflects the total amount of fish and shellfish harvested during the 2009 through 2013 time period, with darker shading indicating a higher total. The figure further illustrates that the most productive sablefish areas coincide with the most productive EGOA areas, in general.

The preceding assessment has obvious limitations. First, the number and expanse of statistical areas fished in a given GOA management area could have as much to do with the size, range, and operational characteristics of the local fleets as it does with the distribution of harvestable biomass. Sablefish areas could be more strongly correlated with total fishing in the EGOA because sablefish make up a larger proportion of total catch in that region. It could certainly be the case that sablefish are found in the SEO area that are not identified as hotspots or are lightly shaded. The figure merely shows the spatial distribution of historical fishing activity. Second, the minimum amount of "space" required for a pot and a HAL operation to share an area without gear conflict is undoubtedly smaller than an ADF&G statistical area. More granular spatial data might give a better sense of how many longline strings could operate simultaneously, but that information is not available, and, in any case, implies some form of coordination among fishermen making and retrieving gear sets – a highly unlikely scenario. Third, this information is aggregated over five years, and does not pick up seasonal variation in fishing patterns or gear predominance. The shading in Figure 32 would look different if the months in each year when mid-water trawl fisheries predominate were dropped. (Doing so, however, would not have an effect on the districts of the EGOA where trawling is prohibited). Moreover, the areas on the map that have been most commonly identified through testimony as having a high risk of grounds preemption – SEO and WY – would only appear more concentrated if the underlying data were pared back to fishing during the peak sablefish season.

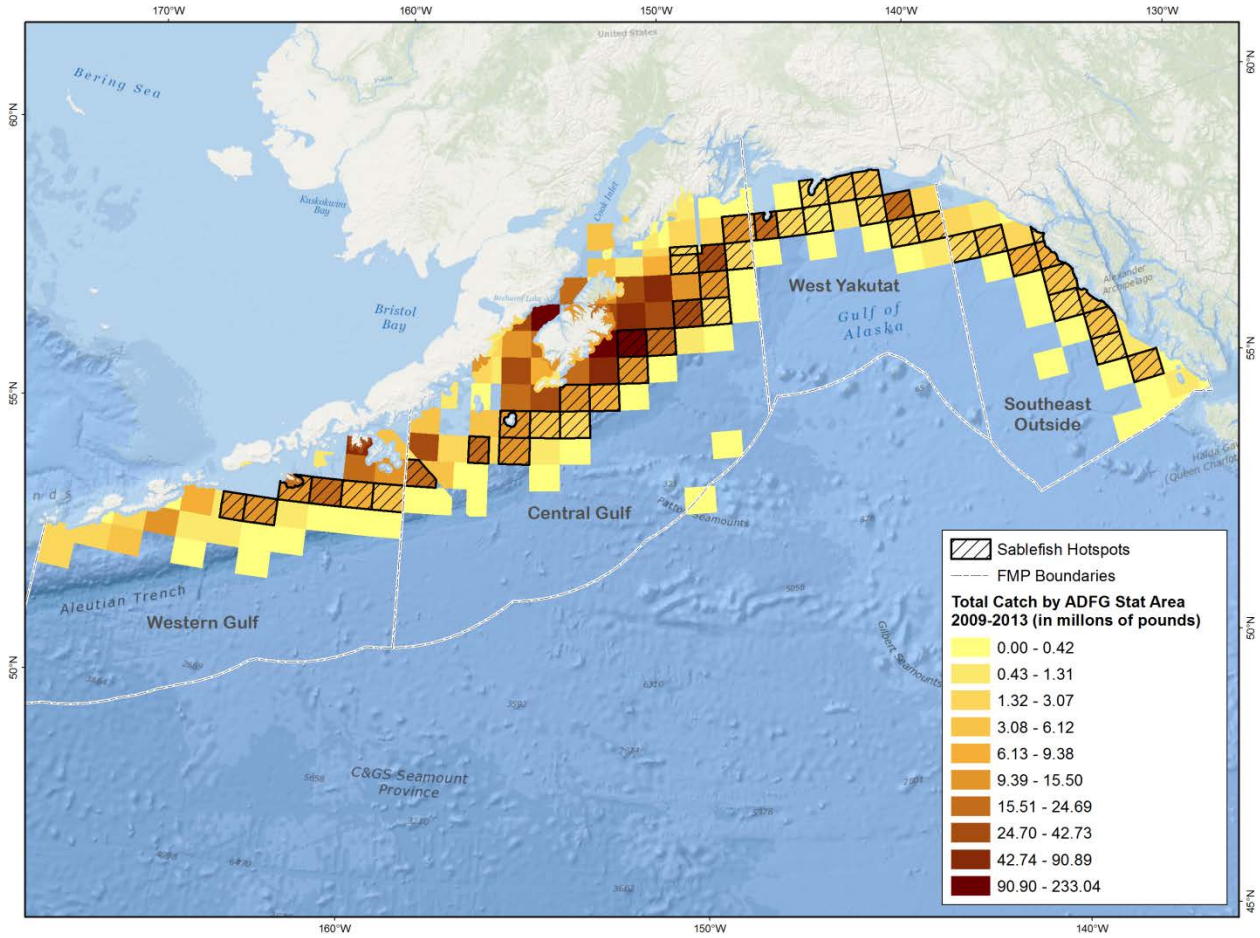
[19] Recall, pot longlines were employed in the GOA sablefish fishery for a period in the 1980s.

Table 26 Proportion of total non-salmon fishing activity occurring in ADF&G statistical areas that are defined as "Sablefish Hotspots", 2009 through 2013 (all catch reported in millions of round pounds)

Area Type	SE	WY	CG	WG	Total
Sablefish Hotspot	45.1	72.8	360.3	76.0	554.1
Other	8.1	4.1	1,172.0	200.4	1,384.5
Total	53.1	76.8	1,532.2	276.4	1,938.6
% from Hotspots	**85%**	**95%**	**24%**	**27%**	**29%**

Source: ADFG/CFEC Fish Tickets, data compiled by AKFIN in Comprehensive_FT.
Note: Data does not include fishing activity in Prince William Sound or Southeast Inside district.

Figure 33 Map identifying ADF&G Gulf of Alaska statistical areas where non-salmon fishing (all gear types) occurred between 2009 and 2013, overlaid with identification of "Sablefish Hotspot" statistical areas during the same time period



Source: Map provided by Pacific States Marine Fisheries Commission, created with ADFG/CFEC Fish Ticket data provided by AKFIN in Comprehensive_FT.
Note: Data does not include fishing activity in Prince William Sound or Southeast Inside district.

4.5.5 Gross Revenues and Dependency

The predominant wholesale product form for GOA sablefish is headed-and-gutted frozen fish (Fissel et al. 2014, Figures 1.9, 1.10, and 1.11). The Economic SAFE reports species subindices for GOA ex-vessel prices and quantity (Fissel et al. 2014, Figure 1.12). After declining since 2004, the GOA sablefish quantity index climbed back to 2008 levels from 2010 to 2012 and was level in 2013. The ex-vessel price

index climbed steadily from 2004 through 2011, but has dropped sharply back to 2008 levels over the two most recent reported years. Still, the total sablefish value share of GOA ex-vessel markets remains around 50 percent of all groundfish species, trailed by Pacific cod and pollock. Rockfish, flatfish, and 'other' species make up smaller amounts of total ex-vessel values.

The Economic SAFE includes the most recent available data on total ex-vessel value for sablefish HAL and trawl activity, but does not provide BSAI pot revenues due to confidentiality constraints. The report also does not estimate a value per pound, so reported ex-vessel revenues are a function of both markets and the amount of fish delivered. Nevertheless, total ex-vessel GOA sablefish HAL gross revenues climbed from $71.2 million in 2009, to $113.4 million in 2011, before declining to $100.6 million in 2012, and further declining to $68.4 million in 2013 (Fissel et al. 2014, Table 19). During the 2009 through 2013 period, around 93 percent of GOA ex-vessel HAL gross revenues accrued to the catcher vessel sector. Total sablefish HAL ex-vessel gross revenues in the BSAI were lower – between $6.5 million and $12.0 million – and displayed a similar annual trend peaking in 2011. BSAI sablefish HAL ex-vessel gross revenues were more comparable between the CV and CP sectors, with the CV sector generating slightly more revenue in each year[20].

Gear-specific average annual sablefish ex-vessel values paid to catcher vessels appear comparable across areas when decomposed to the GOA and BSAI levels. It is thus reasonable to presume that prices paid for pot-caught sablefish in the BSAI IFQ and CDQ fisheries are a decent indicator of what prices could be expected in a GOA pot longline fishery. Table 27 provides average annual sablefish ex-vessel price per pound by gear type, as provided by AKFIN and based on fish ticket data. Table 27 includes both GOA and BSAI data, and shows that HAL sablefish has fetched a higher price than fish caught with pot gear[21]. Ex-vessel prices for sablefish peaked for all gear types in 2011, and have declined since. That trend holds when looking at area-specific data, which is not shown in this document.

Table 27 Average ex-vessel value per pound of sablefish delivered ($), by gear type from 2009 through 2013 (includes GOA and BSAI management areas for HAL and trawl)

Year	HAL	Pot	Trawl
2009	3.11	2.84	2.05
2010	3.69	3.30	2.81
2011	4.94	4.56	4.03
2012	3.96	2.62	3.26
2013	2.79	2.47	2.34

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

The CVs that have landed IFQ sablefish between 2009 and 2013 tend to rely on GOA fixed gear activity for the majority of their gross revenues. Table 28 shows the distribution of fishing revenue sources for these vessels, broken out by vessel length group. In aggregate, GOA fishing for sablefish and halibut IFQ and fixed-gear Pacific cod accounts for 91 percent of the gross ex-vessel revenues for this fleet. Of note, vessels 50 feet LOA or less displayed very low participation in pot gear fishing for Pacific cod, which may indicate that these vessels would have to make a large investment to gear up and reconfigure their operations to fish sablefish with pot longline gear. Larger vessels in the IFQ fleet displayed a more even distribution of IFQ revenue between sablefish and halibut. The smallest vessel size group (less than or

[20] Calculations are based on COAR data.

[21] A discussion paper from February 2014 that describes the GOA Pacific cod pot fishery showed that per pound ex-vessel values were lower for pot gear than for hook-and-line gear in that fishery as well. In that case, the difference was approximately three cents per pound. See Table 3-5 (p.10) of the GOA Pacific Cod Pot Sector Preliminary Data Review available as "GOA Pot Cod Participation Discussion Paper 2/14" under "Documents and Council Motions" at www.npfmc.org/goa-trawl-bycatch-management/.

equal to 40 feet LOA) derived the greatest proportion of their gross revenues from halibut. In aggregate, the recently active sablefish IFQ fleet derived 81 percent of gross ex-vessel revenues from fixed-gear groundfish and halibut fishing. Other fishing revenues would have been generated in fisheries for salmon, herring, or crab. The data in Table 28 comes from fish tickets. Gross revenue is estimated through AKFIN's algorithm.

The 16 CPs that were engaged in the sablefish IFQ fishery from 2009 through 2013 derived the majority of their total gross revenue from Pacific cod HAL fisheries in the BSAI. Looking at only GOA activity, though, these CPs generated significantly more revenue from sablefish IFQ fishing than from either halibut IFQ or Pacific cod HAL fishing. IFQ CPs did not fish with pot gear in any area.

Vessels that fish sablefish IFQ typically also fish halibut IFQ. Over the last five years, the number of vessels participating in both IFQ fisheries has been between 320 and 340.

Table 29 shows gross ex-vessel sablefish IFQ revenues for catcher vessels while fishing in GOA areas. These data pull only from those individuals who held a CFEC permit to target sablefish, so any revenue from the marketing of incidental sablefish catch in other fisheries is excluded. Vessels in the 51 foot to 60 foot LOA category consistently generated the greatest gross revenues of any length group.

Table 28 Distribution of gross ex-vessel revenues for catcher vessels that fished sablefish IFQ, by vessel size, 2009 through 2013

	≤ 40	**41 - 50**	**51 - 60**	**> 60**	**Aggregate**
GOA Sablefish IFQ	19%	32%	44%	42%	41%
GOA Halibut IFQ	63%	59%	42%	43%	45%
GOA PCod (HAL)	6%	6%	1%	1%	2%
GOA PCod (POT)		< 1%	4%	3%	3%
GOA Subtotal	*88%*	*97%*	*91%*	*89%*	*91%*
BSAI Sablefish IFQ	6%	1%	1%	1%	1%
BSAI Halibut IFQ	6%	2%	6%	9%	6%
BSAI PCod (HAL)	< 1%	1%	< 1%	< 1%	< 1%
BSAI PCod (POT)			2%	1%	1%
BSAI Subtotal	*12%*	*3%*	*9%*	*11%*	*9%*
% Total Gross Rev.	***83%***	***78%***	***75%***	***95%***	***81%***

Source: ADFG/CFEC Fish Tickets and AFSC Gross Revenue Procedure compiled by AKFIN.

Table 29 Annual sablefish IFQ ex-vessel revenue for catcher vessels fishing in GOA areas, by vessel length group (2009 through 2013)

YEAR	LENGTH	Ex-Vessel Revenue ($)
2009	≤ 40	570,148
	41 - 50	5,191,084
	51 - 60	32,910,492
	> 60	19,935,603
2009 Total		58,607,327
2010	≤ 40	873,104
	41 - 50	5,976,389
	51 - 60	36,735,890
	> 60	22,382,223
2010 Total		65,967,607
2011	≤ 40	657,839
	41 - 50	9,249,456
	51 - 60	55,787,678
	> 60	31,349,786
2011 Total		97,044,759
2012	≤ 40	934,297
	41 - 50	8,876,651
	51 - 60	50,249,538
	> 60	27,874,942
2012 Total		87,935,428
2013	≤ 40	1,078,845
	41 - 50	5,822,278
	51 - 60	35,236,693
	> 60	17,940,027
2013 Total		60,077,843

Source: ADFG/CFEC Fish Tickets and AFSC Gross Revenue Procedure compiled by AKFIN.

4.5.6 Individual Harvesters and Crew

This section includes background information on the allocation and transfer of harvest opportunities in the GOA sablefish fleet, and management measures that seek to limit consolidation in the rationalized fishery. This section also includes information on the extent to which vessels in the GOA sablefish fishery prosecute multiple management areas, or fish exclusively in one area.[22] Understanding fleet participation across management areas informed the Council's recommendation on how to apply differentiated vessel-level pot limits in the various GOA management areas. The latter portion of this section provides information relating to the number of crew jobs that might be expected on a vessel using HAL gear as opposed to a vessel using pot longline gear.

Sablefish IFQ holdings consolidated rapidly after program implementation in 1995, resulting in greater per capita quota holdings distributed among fewer individuals. The rate of consolidation in the fishery has slowed, but further consolidation would be a threat to employment opportunities and the stability of communities that rely on a robust and diverse homeport fleet. Regulations limit consolidation in the IFQ Program through QS use caps on individual holdings of quota shares, and vessel IFQ caps on the amount

[22] Data from 2013 and 2014 on participation across management areas was presented to the Council as an analytical supplement in April 2015.

of sablefish that can be harvested by a given vessel in a year. However, room still exists for further consolidation between the present state of the fishery and the limits listed in Table 35.

Table 30 shows the number of unique sablefish QS holders in each management area for the first year of the program (1995) and the most recent complete year. The total available harvest, or IFQ allocation, for each management area was provided in Table 17 (Section 4.5.4). While the number of QS holders has decreased over the course of the program, average QS holdings per individual have increased (those figures are adjusted to IFQ pounds using the QS:IFQ ratios for 1995 and 2014). The fact that average QS and IFQ pounds are significantly higher than the median values indicates that individuals in the top percentiles of the ownership distribution hold large amounts of quota share relative to individuals in the middle and lower end of the population that holds QS.

Many individual permit holders have sablefish QS for multiple management areas. The matrix in Table 31 shows the different management areas in which QS holders hold IFQ in 2015, demonstrating that stakeholders tend to have a portfolio of harvest privileges that spans multiple areas.[23] For example, 320 individuals hold QS for the SEO area in 2015; of those 320 individuals, 79 held QS for WY, 66 for CGOA, 26 for WGOA, 10 for BS, and 6 for AI. The matrix does not show how many individuals hold QS for a single GOA area. Looking only at the 750 holders of GOA area QS in 2015 (active fishermen and those who leased out their quota), 502 entities held QS in only one area: 259 only held QS in SEO, 157 only held QS in CGOA, 52 only held QS in WGOA, and 34 only held QS in WY. The average QS holdings of individuals with quota in only one area were significantly smaller than the holdings of individuals with holdings across multiple areas.

The majority of sablefish QS holders also possess halibut QS in some Alaska halibut regulatory area. Across both the GOA and the BSAI, 821 individuals hold sablefish QS for 2015. Of that population, 569 also hold halibut QS.

Overall, 362 unique vessels landed sablefish IFQ during 2013 or 2014 (331 in 2013, and 313 in 2014). Of those 362 vessels, 37 were 40 feet LOA or smaller, 97 were between 41 feet and 50 feet LOA, 165 were between 51 feet and 60 feet LOA, and 63 were greater than 60 feet LOA. Table 32 describes vessel participation in the sablefish IFQ fishery across multiple management areas. For example, 201 vessels landed sablefish IFQ from SEO at some point during that time period; 76 of those vessels also recorded a landing from WY, and four of those vessels also recorded a landing from the AI. Sixty-two vessels recorded landings in both the CGOA and WGOA. Table 33 filters out the vessels that fished exclusively in one management area during the 2013 to 2014 time period, and describes that subset of vessels by their length overall (LOA). For example, of the 201 vessels that landed GOA sablefish IFQ in SEO, only 84 fished in another management area. The 117 SEO vessels that fished only in SEO tended to be between 41 feet and 60 feet LOA (102 out of 117). By contrast, all but two of the 118 vessels that landed an IFQ sablefish in WY also fished in another area. Table 34 provides a more detailed account of how vessel participation spans specific management areas. This information informs the Council's decisions on whether to permit pot longline gear in only certain GOA areas (not part of the preferred alternative), or whether to recommend requirements and specifications that are unique to certain areas. Table 34 describes the activity of 163 unique vessels that landed sablefish from multiple GOA areas during either 2013 or 2014 (thus, excluding any vessel that only participated in a single area, or in the BSAI).

[23] Table 31 does not account for leasing of annual IFQ.

Table 30 Sablefish quota share (QS) holdings and IFQ pounds, at initial issuance (1995) and in 2014

		Area					
	Year	WG	CG	WY	SE	BS	AI
QS Holders	1995	234	645	457	715	145	135
	2014	159	363	232	392	100	89
Avg. QS	1995	154,215	172,937	117,003	93,145	128,460	233,468
Units	2014	226,601	307,677	229,597	168,675	187,653	358,792
Median QS	1995	39,938	35,051	30,546	34,535	45,861	63,327
Units	2014	94,473	109,941	88,793	103,041	76,623	93,294
Avg. QS	1995	18,950	23,661	18,194	17,651	11,060	21,828
Pounds	2014	16,417	22,744	14,206	15,157	11,817	26,901
Median QS	1995	4,908	4,796	4,750	6,544	3,948	5,921
Pounds	2014	6,844	8,127	5,494	9,259	4,825	6,995

Source: NMFS RAM

Table 31 Individual permit holders with sablefish IFQ across multiple areas, 2015

	AI	BS	CG	SE	WG	WY
AI	36	18	16	6	14	10
BS		46	24	10	25	16
CG			283	66	70	137
SE				320	26	79
WG					110	41
WY						185

Source: NMFS RAM and Fish Ticket data, provided by AKFIN.

Table 32 Vessel participation in the sablefish IFQ fishery, by area (2013 and 2014, combined)

	SE	WY	CGOA	WGOA	BS	AI
SE	201	76	64	23	10	4
WY		118	96	36	12	9
CGOA			192	62	24	17
WGOA				67	25	15
BS					41	20
AI						36

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

Table 33 Sablefish IFQ participation, breaking out vessels that fished solely in one management area (2013 and 2014, combined)

	# Vessels						
Area	Total	Fished Mult. Areas	Fished One Area	Length Group (LOA)			
				≤ 40'	41' - 50'	51' - 60'	> 60'
SE	**201**	**84**	**117**	13	54	48	2
WY	**118**	**116**	**2**		1	1	
CGOA	**192**	**132**	**60**	13	24	15	8
WGOA	**67**	**66**	**1**			1	
BS	**41**	**35**	**6**	2		2	2
AI	**36**	**26**	**10**	1		5	4

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

Table 34 Combinations of multiple-area participation, by vessel (2013 and 2014, combined)

# Areas Fished	# Vessels	Areas	# Vessels
6 of 6	2	SE/WY/CG/WG/BS/AI	2
5 of 6	11		
		All but AI	6
		All but SE	3
		All but WY	1
		All but BS	1
4 of 6	19		
		SE/WY/CG/WG	12
		CG/WG/BS/AI	4
		WY/CG/WG/AI	2
		SE/WY/CG/BS	1
3 of 6	54		
		SE/WY/CG	34
		WY/CG/WG	10
		CG/WG/BS	5
		WG/BS/AI	2
		SE/CG/WG	1
		WY/CG/AI	1
		CG/BS/AI	1
2 of 6	77		
		SE/WY	20
		WY/CG	24
		CG/WG	15
		SE/CG	6
		CG/AI	2
		WG/BS	2
		CG/BS	1

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

Table 35 Sablefish quota share (QS) use caps, vessel IFQ caps, and annual TAC for 2013 through 2015

QS Use Caps (Ownership)	2013	2014	2015	Units
1% of SE Quota Share Pool*	688,485	688,485	688,485	QS
1% of total sablefish QSP	3,229,721	3,229,721	3,229,721	QS

Vessel IFQ Caps	2013	2014	2015	Units
1% of SE sablefish IFQ TAC	70,327	59,414	59,127	round lbs.
1% of all sablefish IFQ TAC	280,139	236,796	235,694	round lbs.

Annual Sablefish IFQ TAC	2013	2014	2015	Units
Southeast	7,032,674	5,941,397	5,912,737	round lbs.
All Areas (includes BS & AI)	28,013,851	23,679,609	23,569,378	round lbs.

* Based on 1996 quota share pool
Source: NMFS RAM

Sablefish IFQ QS is issued in three vessel categories: A, B, and C. Category A QS is for use on vessels that process at sea. Category B QS is for use on catcher vessels (CVs) that do not process at sea and are greater than 60 feet LOA. Category C QS is for use on CVs that are 60 feet LOA or less. Table 36 shows how sablefish QS units are distributed across GOA management areas in 2015. Overall, 85 percent of GOA sablefish quota share units are allocated for the CV categories (B and C); over 90 percent of QS units are allocated for CV categories in SEO and WY. Southeast Outside is the only management area where the majority of QS is allocated to the under 60 feet LOA vessel category.

Table 36 2015 QS holdings by vessel size category in GOA areas

Category	SE	WY	CG	WG	Total
A	9%	8%	16%	38%	16%
B	20%	60%	47%	43%	43%
C	70%	31%	37%	19%	42%

Table 37 shows the distribution of individual QS holdings as reported by NMFS RAM for 2014. Note that a non-trivial portion of individuals hold QS amounts that, when converted to annual IFQ pounds, would not be sufficient to support a viable operation. These QS holders are likely among those who stack multiple holdings on a single vessel, or "walk on" to another vessel where their IFQ can be fished along with other permit holders' IFQ. The stacking of IFQ is evidenced by the fact that there are more QS holding individuals (shown in the highlighted row of Table 37) than there are active vessels in the fishery (see Table 12). While stacking of IFQ is permitted and can be essential to viable fishing of small holdings, actions that have the unintended consequence of promoting further stacking can create adverse socioeconomic impacts; this potential impact is discussed qualitatively in the analysis of impacts (Section 4.9).

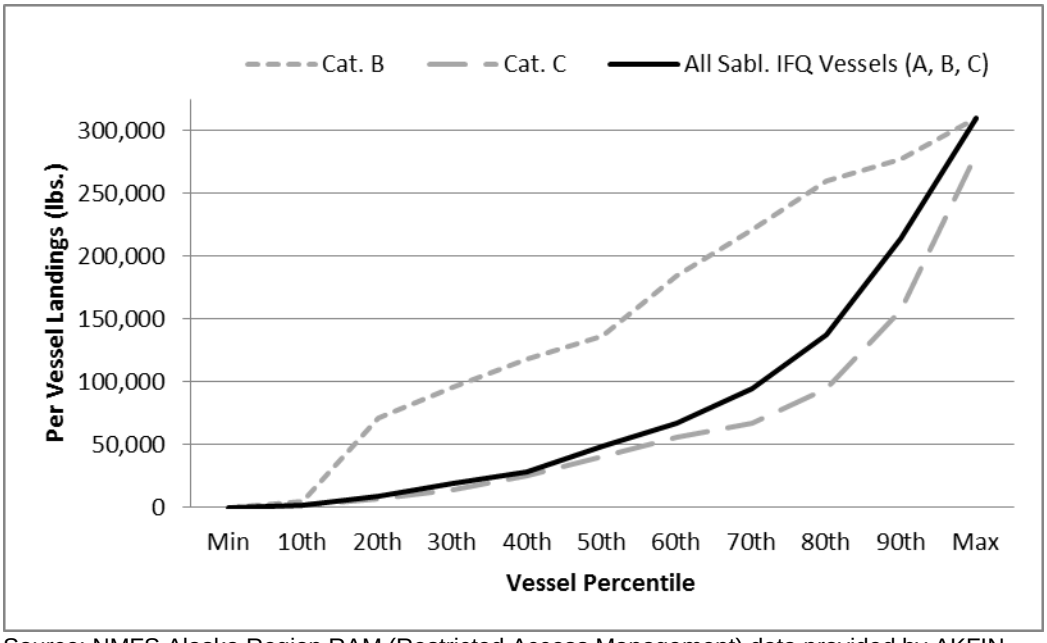
Table 37 2014 number of individuals holding GOA sablefish QS and QS ownership amounts (at selected percentiles) for each vessel category (A, B, C) in each GOA area. Holdings are denominated in 2014 IFQ pounds.

		WG			CG			WY			SE		
	Vessel Category	A	B	C	A	B	C	A	B	C	A	B	C
	# QS Holders	35	79	64	45	155	210	29	102	131	36	82	302
Percentile	10th	741	22	12	1,041	269	31	184	533	12	2,067	69	63
	20th	1,881	284	46	2,429	2,817	212	684	2,477	220	3,312	1,249	1,600
	30th	5,504	2,991	367	6,964	4,781	887	1,574	3,820	1,432	4,808	2,708	3,655
	40th	7,982	5,311	1,712	9,000	7,679	2,668	2,916	6,040	2,804	6,653	4,705	5,685
	50th	9,674	7,092	4,130	11,940	11,378	5,118	4,950	9,588	4,353	9,302	6,946	8,217
	60th	22,543	9,257	5,087	18,728	21,859	8,009	6,783	17,024	5,287	10,428	12,693	12,091
	70th	26,157	13,734	7,357	31,738	30,275	14,548	8,453	28,046	7,220	11,069	17,149	17,963
	80th	42,821	21,778	11,798	48,124	42,546	26,832	15,087	35,662	12,366	19,082	23,839	24,027
	90th	98,185	36,055	20,154	80,033	67,297	40,760	23,315	51,454	24,562	35,364	41,230	36,513
	Max	143,489	86,859	68,233	134,502	185,967	116,573	58,910	106,209	52,411	128,048	116,231	75,962

Source: NMFS RAM

Figure 33 illustrates the distribution of sablefish landings per vessel in 2013, for comparison to the vessel IFQ cap listed in Table 35, above. Landings are aggregated across all IFQ management areas (GOA and BSAI), since the larger of the two vessel caps is applied to landings in all areas. The figure suggests that while some vessels harvested up to the cap level[24], most could accommodate additional IFQ pounds leased from other QS holders or fished by a QS holder who "walks on" to another vessel instead of fishing from his or her own platform. Relatively fewer vessels fishing Category C QS were close to the cap level in 2013. Table 38 shows the IFQ landings (in round pounds) of vessels at each decile marker. Of the vessels whose landings ranked above the 90th percentile, three were CPs, 17 were CVs greater than 60 feet LOA, and 13 were CVs less than or equal to 60 feet LOA.

Figure 34 2013 per-vessel landings of sablefish IFQ (round lbs.) across all areas



Source: NMFS Alaska Region RAM (Restricted Access Management) data provided by AKFIN.

[24] A small number of vessels fished above the vessel IFQ cap as a result of a grandfather provision for individuals whose initial QS allocations exceeded the established cap. Similar cases are also apparent when examining 2013 landings by vessel for the SEO management area, where a separate vessel IFQ cap is also applied.

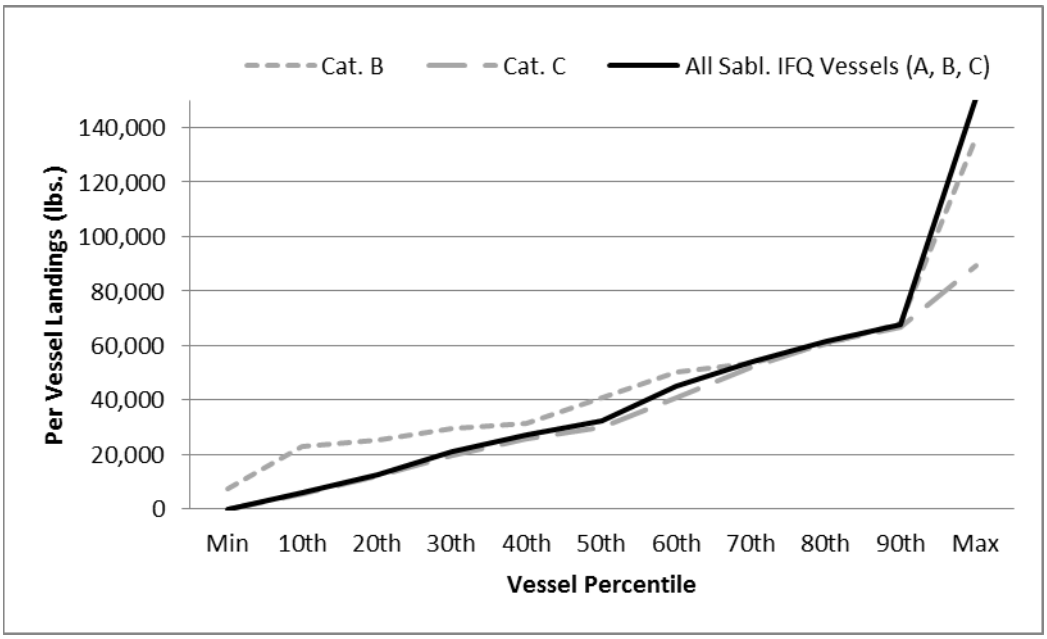
Table 38 2013 vessel counts and distribution of landings by vessel (2013 IFQ lbs.)

	Vessel Category (Vessel Group)	A (CP)	B (CV > 60' LOA)	C (CV ≤ 60' LOA)	All Vessels
	Vessel Count	7	53	268	328
Percentile	10th	Conf.	4,792	1,361	1,849
	20th	Conf.	70,729	7,374	8,493
	30th	Conf.	96,015	14,190	19,338
	40th	Conf.	118,566	25,399	28,597
	50th	Conf.	136,657	40,887	48,654
	60th	Conf.	184,623	56,036	66,745
	70th	Conf.	220,719	66,936	94,279
	80th	Conf.	260,362	94,685	137,204
	90th	Conf.	277,187	156,611	214,101

Source: NMFS Alaska Region RAM (Restricted Access Management) data provided by AKFIN.

Figure 34 shows the distribution of 2013 sablefish IFQ catch in the SEO management area, where a vessel IFQ cap of around 70,000 round lbs. applied. Vessels reporting catch above that cap were able to do so because of grandfather provisions based on the QS holders' initial program allocations. Category B and C vessels around the 80th percentile for 2013 landings recorded roughly 60,000 lbs. of SEO sablefish catch, and vessels around the 90th percentile were just below the vessel cap. Of 186 total active SEO vessels, only three fished Category A QS (processed at sea). Roughly 88 percent of the SEO sablefish IFQ vessels active in 2013 fished Category C QS.

Figure 35 2013 per-vessel landings of sablefish IFQ (round lbs.) in SE area



Source: NMFS Alaska Region RAM (Restricted Access Management) data provided by AKFIN.

QS units are held either as indivisible quota blocks or as "unblocked" QS units that can be transferred individually. Quota blocks were introduced as a measure to limit consolidation, ensuring that the smallest, most affordable QS parcels would remain available to small operators in order to maintain some of the fleet diversity that existed prior to rationalization of the halibut and sablefish fishery, thereby making the

IFQ Program less disruptive to isolated Alaska fishing communities. An initial allocation of halibut or sablefish QS that translated into fewer than 20,000 lbs. (based upon the 1994 TAC) was "blocked", meaning that it must be bought and sold as a unit. A "sweep-up" provision allowed very small blocks to be combined into a more economically fishable amount if the total combined QS was less than a certain amount. The sweep-up consolidation limit was raised in 1996, and then again in 2004 and 2006. For sablefish, an individual who holds only blocked quota in a given management area may not own more than two QS blocks. An individual who owns some unblocked QS in an area may hold only one QS block in addition to that unblocked quota. Calculating the "maximum potential consolidation" is greatly complicated by the many permutations of willing QS buyers divesting blocks in order to buy unblocked QS, or trading up in block size. As a result, that calculation is not attempted in this analysis. Table 39 shows the proportion of QS units in each GOA management area that is held in blocks, and the number of QS blocks within the QS pool for each vessel size category.

Table 39 Blocked and unblocked GOA sablefish quota share (QS) for the 2015 QS pool, by vessel category

Area	Total QS	Unblocked QS	Blocked QS	# Blocks	# Blocks & QS by Category					
					A		B		C	
SE	66,120,619	85%	15%	284	9	418,486	29	1,182,431	246	8,123,648
WY	53,266,430	87%	13%	186	11	340,341	44	1,935,567	131	4,643,183
CG	111,686,622	92%	8%	253	8	265,670	71	2,481,451	174	5,645,933
WG	36,029,579	80%	20%	122	14	705,790	48	2,952,999	60	3,534,635

4.5.6.1 Quota Share Transfer Eligibility

Eligibility to receive CV QS by transfer is generally restricted to those persons who received QS by initial issuance and those individuals who can demonstrate that they have served as a member of the harvesting crew in any U.S. fishery for at least 150 days. Non-initial recipients that meet the 150 days sea time requirement are designated as "IFQ Crewmembers" and, upon approval, NMFS/RAM issues them a Transfer Eligibility Certificate (TEC). Table 40 displays the number of TECs issued, by residency, to IFQ crewmembers since the program began. The table also shows how many of those IFQ crewmembers were holding QS as of November 2014.

One exception to the eligibility criteria is eligible non-profits representing GOA communities approved under community protection measures in the IFQ Program (Community Quota Entities).

Table 40 Summary of Transfer Eligibility Certificate (TEC) issuance 1994 through 2014 and crewmembers holding QS at year-end 2014

Residency	Crew member[a] TECs issued 1994 Nov. 2014	Crew members[a] holding QS/IFQ, Nov. 2014
Alaskan[b]	2,455	877
Non-Alaskan[b]	1,115	312
Total[c]	3,570	1,189

[a] An "IFQ Crew member" is an individual who did not receive QS/IFQ by initial issuance, but applied for and was issued a TEC.
[b] "Alaskan" and "Non-Alaskan" are premised on the applicant's most recently self-reported address; NMFS/RAM makes no effort to verify a person's State of legal residence.
[c] Persons without known addresses are excluded from this table.
Source: http://www.alaskafisheries.noaa.gov/ram/daily/ifqcrew.pdf

4.5.6.2 Crew Size

The impacts section of this RIR will discuss whether or not the considered alternatives, including the preferred alternative, might affect the number of crew jobs available in the fishery. For background, the analysts looked at self-reported crew information found on ADF&G fish tickets during the analyzed period (2009 through 2013).[25] Table 41 shows average, minimum, and maximum crew sizes reported for fixed-gear vessels of different size groups that fished for Pacific cod in the GOA and BSAI areas. Pacific cod data was used in order to make a comparison between pot and hook-and-line CV operations in the GOA. No such comparison could be made for historical sablefish data, since no pot gear was used in the GOA. The table does not indicate a systematic difference in crew size for vessels using pot and HAL gear. Variance was greater in the underlying data for HAL crew sizes, but the number of observations was also greater.

Table 41 Crew size by vessel size group for GOA and BSAI fixed-gear cod catcher vessels, 2009 through 2013

	≤ 40						41 - 50						51 - 60						> 60					
	HAL			POT			HAL			POT			HAL			POT			HAL			POT		
Year	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max
2009	3	1	4	3	3	4	3	1	9	3	2	4	4	2	7	4	1	6	5	2	6	5	3	7
2010	3	1	4	3	2	3	3	1	4	3	2	4	4	2	8	4	2	6	5	3	6	5	3	7
2011	3	1	4	3	2	4	3	1	5	3	2	5	4	2	6	4	1	6	6	3	7	5	3	7
2012	3	1	5	3	2	4	3	1	5	3	2	5	4	2	6	4	2	6	5	3	7	5	3	9
2013	3	1	4	3	2	5	3	1	5	3	2	5	4	1	6	4	1	6	5	3	7	5	3	8

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

4.5.7 Communities

One of the principal objectives for regulation of the sablefish IFQ fishery is to maintain the economic viability of small communities that are heavily dependent on fishing as a source of income.

[25] Information on the number of crew operating a vessel is also collected by observers. Though it is self-reported, the analysts chose to use fish ticket data because observer coverage only covers a subset of the relevant IFQ fleet. AKFIN provided the fish ticket crew data, and advised that data quality should be considered sufficiently accurate, noting that in the BSAI crab fishery an EDR field for the number of crew had been removed from the final version of the form because that information was already provided on fish tickets.

Sablefish fishing and processing provides an important source of revenue and makes up a substantial share of local incomes. The sablefish fishery, in addition to fisheries for salmon and Pacific halibut, is particularly important for the incomes in Southeast Alaska communities. The allowance of a new gear type triggers concern about potential adverse effects on small, reliant communities.

The Alaska Fisheries Science Center's Economic and Social Sciences Research Program has developed a set of fisheries engagement and reliance indices using fishery and secondary data for communities that are involved in commercial harvesting and processing of GOA sablefish IFQ (Kasperski and Himes-Cornell, 2014). AFSC's indices provide a novel way to measure both engagement in and reliance upon the GOA sablefish IFQ fishery, and are an improvement upon the simple reporting of QS ownership and IFQ deliveries by locality. Engagement represents the scale of the industry in the community, while reliance represents the importance of the industry in terms of engagement per resident[26]. Separating harvesting and processing indicators allows for the inclusion of communities that have a large number (or per capita share) of IFQ QS holders, but do not receive a large amount of GOA sablefish IFQ landings. Developing indices allows for the assimilation of large amounts of information from correlated variables, and is an alternative to the time-intensive and costly method of collecting primary data through in-person interviews.

Data were collected from State and Federal sources for 261 communities throughout the U.S. and Canada, including 62 communities from Alaska, 95 from Washington, 34 from Oregon, 13 from California, 2 from Canada, 55 other communities in the U.S. Virgin Islands, Hawaii, and the continental United States. Communities were selected for inclusion in the study population if commercial GOA sablefish IFQ landings were made in the community, if the owner of a vessel that fished in the GOA sablefish fishery resides in the community, or if a GOA sablefish IFQ QS holder resides in the community.

The commercial processing category includes the amount of commercial landings, commercial revenue, the number of delivering vessels, the number of individuals making deliveries, and the number of registered buyers in each community. The commercial harvesting category includes the amount of GOA sablefish IFQ QS held by residents, the number of QS holders, the number of vessels owned by residents that had commercial GOA sablefish IFQ landings, the number of residents that had commercial GOA sablefish IFQ deliveries, commercial landings on vessels owned by residents, and commercial revenue from vessels owned by residents in each community.

Communities are defined as being "not engaged" in the GOA sablefish IFQ fishery if they had only zero-values for the included variables, "moderately engaged" if they had an index score between -1/+1 standard deviation from the mean, and "highly engaged" if they had an index scores that is +1 standard deviation above the mean index score. Table 42 lists all communities that are defined as "high" engagement or reliance for either the processing or harvesting index[27]. Of the 261 communities included in AFSC's analysis, only Seward has a total index score of 4 (out of 4 possible). Kodiak, Petersburg, and

[26] The authors of the index study acknowledge that population size has a strong effect on indicators measuring fishery reliance.

[27] Principal components analyses were conducted for each category to determine a community's relative engagement and relative reliance for each category. Principal components analysis, a variable reduction strategy, separates a large number of correlated variables into a set of fewer, linearly independent components. These components are used to create quantitative indices that bring together information from several variables that can help represent specific concepts of fisheries involvement. Four principal components analyses are included in this study to create four indices of fisheries involvement for each community: commercial processing engagement, commercial processing reliance, commercial harvesting engagement, and commercial harvesting reliance. All results presented involve a varimax rotation of the factor loadings, Kaiser normalization, keeping only the components with eigenvalues greater than 1, and have a theta reliability score above 0.95. Component scores for each community were created for each component of vulnerability using the regression method by summing the standardized coefficient score multiplied by the included variables (Kasperski and Himes-Cornell, 2014).

Sitka have a total index score of 3. Eight communities have a total index score of 2. Twelve communities have a total index score of 1. The other 238 communities have a total index score of zero. The three communities with a total index score of 3 (Kodiak, Petersburg, and Sitka) all rank highly for commercial processing engagement, commercial harvesting engagement, and commercial harvesting reliance. Six communities rank highly in both commercial processing engagement and commercial harvesting engagement: Seward, Kodiak, Petersburg, Sitka, Homer, and Juneau. Three communities, Seward, Elfin Cove, and Port Alexander, all rank highly in both the commercial processing reliance and commercial harvesting reliance.

Appendix 4 contains maps showing community engagement and reliance upon the GOA sablefish IFQ fishery. That Appendix also contains a table showing the factors considered in each index, the relative weighting, and the amount of variance in the dependent engagement/reliance index captured in the included factors.

Table 42 Community engagement and reliance indices of fisheries involvement for all communities that are considered "high engagement/reliance" for at least one index

Community	Population	Commercial Processing Engagement	Commercial Harvesting Engagement	Commercial Processing Reliance	Commercial Harvesting Reliance	Total
Seward, Alaska	2,693	1	1	1	1	4
Kodiak, Alaska	6,130	1	1	0	1	3
Petersburg, Alaska	2,948	1	1	0	1	3
Sitka, Alaska	8,881	1	1	0	1	3
Elfin Cove, Alaska	20	0	0	1	1	2
Homer, Alaska	5,003	1	1	0	0	2
Hoonah, Alaska	760	1	0	1	0	2
Juneau, Alaska	31,275	1	1	0	0	2
King Cove, Alaska	938	1	0	1	0	2
Port Alexander, Alaska	52	0	0	1	1	2
Sand Point, Alaska	976	1	0	1	0	2
Yakutat, Alaska	662	1	0	1	0	2
Addy, Washington	268	0	0	0	1	1
Akhiok, Alaska	71	0	0	1	0	1
Bellingham, Washington	80,885	1	0	0	0	1
Chicken, Alaska	7	0	0	0	1	1
Cordova, Alaska	2,239	1	0	0	0	1
Unalaska, Alaska	4,376	1	0	0	0	1
Excursion Inlet, Alaska	12	0	0	1	0	1
False Pass, Alaska	35	0	0	1	0	1
Pelican, Alaska	88	0	0	0	1	1
Seattle, Washington	608,660	0	1	0	0	1
Seldovia, Alaska	255	0	0	0	1	1

Source: Kasperski & Himes-Cornell, 2014

4.6 Pot Limits and Pot/Buoy Tags in Other Fisheries

This section describes the use of pot tags and buoy tags in Alaska, Washington, Oregon, and California state-waters fisheries. The purpose of including this information is to provide examples of how tag programs are administered, and the range of associated costs. Gear tags are used to enforce pot limits in limited access fisheries. The size of the pot limits in these fisheries is reported for reference only, and is not meant to inform the Council's recommendation in regards to Alternative 2, Element 1; appropriate pot limits are unique to each fishery and management area.

4.6.1 Alaska

Pot limits presently exist only in state-managed Alaska fisheries. Prior to rationalization, Federal crab fisheries in the BS were subject to pot limits based on vessel length. The rationalized crab fishery removed the derby nature of the fishery, and with it the incentive to fish the maximum amount of gear that the vessel could support. Crab vessels are now able to optimize the number of pots onboard for catch capacity and the ability to haul gear in an efficient rotation. The resulting fishery uses fewer pots per vessel, and so pot limits and pot tags were no longer deemed to be necessary. Furthermore, participants in the Federal fishery are now able to join gear cooperatives in which fishermen can receive permission to haul one another's gear under certain circumstances. Such provisions would have complicated the continued enforcement of pot limits.

Pot limits are enforced in state-managed fisheries for Pacific cod, Tanner crab, Dungeness crab, and king crab. Pot tags, buoy tags, or both, are required so that enforcement officers can tell whether the vessel is using more gear than is permitted. A citation would be issued if untagged gear is observed at sea or when making a landing. Participants who register the vessel and their gear with ADF&G receive a sequentially numbered series of tags that is specific to a certain fishery, area, and season – often color coded. The management office records the recipient's permit and vessel numbers so that they are linked to a specific series of tags in a spreadsheet that is provided to enforcement agencies. Recording the vessel number enables ADF&G to ensure that vessel pot limits are not exceeded when multiple permit holders fish from the same platform. Issuing tags to multiple permit holders who intend to fish on the same vessel can be challenging when tags are issued from different management offices. The spreadsheet allows managers to go back and check that the number of tags associated with a given vessel is within the vessel limit.

Tags may be issued in person or mailed to a distributing partner in a fishing community. Often a processing plant, a municipal office, or a tribal office plays a role in getting tags to the fishermen.

Most of the state fisheries described here have one pot limit that applies to all users. The Dungeness crab fishery in Southeast Alaska adopted a tiered pot limit system when it shifted to limited entry management in the late 1990s. Participants in that fishery have an individual limit ranging from 75 pots to 300 pots, depending on historical participation. The SE Dungeness crab fishery also has a vessel limit of 300 pots. Two permit holders with individual limits of 225 pots each could not fish more than 300 pots combined on a vessel. In practice, it is not common for individuals with higher pot limits to stack permits on a vessel; rather, an individual with a 225 pot limit might combine with another fisherman who can fish up to 75 pots.

Most of these fisheries issue pot tags on a one year basis; however, the SE Dungeness crab fishery moved to a two year cycle to reduce expenses for fishermen and management. In some cases, a multi-year cycle is not practicable because fishermen participate concurrently in several pot fisheries that have different gear limits. For example, the SE king crab fishery has a 100 pot limit, while the SE Tanner crab fishery has an 80 pot limit. A fisherman could use 80 pots to prosecute the fisheries at the same time, then could unregister from the Tanner crab fishery and receive 20 additional tags. Issuing 100 tags for a two year

period would require the department to retrieve those 20 additional tags before the fisherman could fish Tanner crab the following year.

The fisheries discussed here are typically prosecuted with single pots, meaning that tags can be affixed to the buoy above the waterline; this would differ from the likely use of pot tags in a pot longline fishery, where tags would have to be submerged with each of the pots affixed to the groundline between two end buoys. Tags for submerged pots would need to be of sound construction. Alaska state fisheries use tags made of metal or plastic, tied to the pot or buoy with twine. ADF&G managers contract with materials suppliers to acquire pot tags, estimating the number needed for a certain season based on registration for the fishery. Reported acquisition costs range between 60 cents and $1.25 per tag. The cost to fishermen is typically $1.50 to $2.00 per tag. The margin covers shipping costs, some administration, and the cost of overstock tags that are not issued due to lower than expected fishery registration. The budgets for tag programs are held in a separate account, so any remaining funds are applied to tag orders in subsequent years, and not used elsewhere in the department.

Tags can be lost even if the gear is retrieved. 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 lost tag while at sea typically radio 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. Replacement tags are issued at the normal cost after a permit holder submits a lost gear affidavit. Sometimes tender vessels are used to deliver replacement tags to vessels that are still on the fishing grounds. An affidavit will typically include information on the cause of the loss, and the last known latitude and longitude of the gear if the pot was lost as well. 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.

4.6.2 U.S. West Coast

Similar to the Alaska region, there are no pot limits in the Federal groundfish pot fishery off the U.S. Pacific coast. However, state-managed fish, crab, and shrimp fisheries do have pot limits in Washington, Oregon, and California[28]. All three states have pot limits for Dungeness crab. Tiered Dungeness pot limits range from 175 to 500 pots. California requires a buoy tag; Oregon requires a pot and a buoy tag, and buoys must be marked with vessel and owner identifiers; Washington requires a buoy tag, and buoy must be marked with a vessel identifier, the license number, and a telephone number. Pots for spot prawns are not limited in Oregon, but are limited to 500 per permit in Washington, and 300 or 500 per permit in California. Coonstripe shrimp pots are limited to 500 or fewer in each of the Pacific coast states. "Near shore live fish" pots are limited to 50 in California. Hagfish pot limits range from 100 in Washington to 500 in California, but pot tag requirements are not mentioned. Sablefish fisheries do not have pot limits.

Tags for California's limited entry Dungeness crab fishery are issued for a two year period, and cost $5 each. The pot limit was implemented in 2013[29]. The program features a waiver process that allows another permitted Dungeness crab vessel to retrieve a fisherman's gear under extenuating circumstances,

[28] NOAA's "Fixed Gear Guide: California, Oregon, and Washington Commercial Fisheries – Trap/pot, gillnet, and longline/set line." Available at: http://www.westcoast.fisheries.noaa.gov/publications/protected_species/marine_mammals/large_whale_entanglement_appendix_a-e.pdf

[29] http://www.dfg.ca.gov/marine/invertebrate/traplimit.asp

such as a vessel breakdown. Permit holders are required to purchase the tags even if they do not intend to fish. The fishery has seven tiers of pot limits, ranging from 175 pots to 500 pots, based on pounds landed between 2003 and 2008. Buoy tags are sequentially numbered, and vary in color to indicate the permit holder's pot limit tier. Enforcement does a full accounting of tags at the end of each season. Pot limits are transferable from one permit holder to another, with one exception that bars Tier 7 (smallest pot limit) from transferring any of their pot tags for at least the first two years of the program. California caps the number of replacement tags that can be issued to a given permit holder in a given year; the replacement cap varies by tier. A replacement fee of $10 covers the new tag and processing, but replacement fees can be waived in the case of a catastrophic gear loss, such as the loss of an entire string.

Oregon implemented a limited entry system for its Ocean and Columbia River commercial crab fishery in 1995. A pot limit was added in 2006, to reduce excess effort in the fishery. Permitted vessels were capped at 200, 300, or 500 pots[30]. As mentioned above, Oregon requires both pot and buoy tags. As of 2013 (Oregon House Bill 3262), fishermen can receive a post-season permit to go out and retrieve lost gear. The person who recovered the pot may use, sell, or dispose of the pot as they wish after they have documented the recovery with the state, regardless of whether or not it was their own gear. Pot and/or buoy tags are used to identify the origin of the lost gear.

Washington applies crab pot limits at the vessel level, regardless of how many permit holders are associated with the platform. Dungeness crab pots are limited to either 300 or 500 pots, based on landings history between 1996 and 1999. Other shellfish pot limits are determined by the fishing area; Grays Harbor is limited to 200 pots per vessel and Puget Sound is limited to 100 pots. As mentioned above, both buoy tags and pot tags are required, and pot tags must contain name, license number, and contact information. License holders must register their buoy brand and color with the managing agency prior to the season. Lost tags must be declared, and the form includes the location and date at which the pot was last observed, as well as the presumed cause of the loss. Lost tags can be replaced, but the number of replacement tags that a permit holder can request is limited based on the point during the fishing season. In other words, a fisherman could not replace an unlimited number of lost tags all at once[31].

4.7 Whale Deterrence Efforts

After initial review of this analysis, the Council asked staff to develop a summary of cooperative research and field studies on whale deterrence that have been conducted by fishermen, scientists, and technology companies. This section provides a broad picture of the activities of a partnership located in the EGOA, several examples of whale deterrent technology that have been tested in Alaska and beyond, and references to academic literature on the subject.

The Southeast Alaska Sperm Whale Avoidance Project (SEASWAP) describes itself as a "unique collaboration between commercial fishermen, scientists, and fisheries managers" located in Sitka, Alaska [32]. SEASWAP's goal is to understand the relationship between sperm whales and fishermen and to recommend strategies to reduce those interactions. Some of SEASWAP's research initiatives, findings, and recommendations are summarized in Section 4.7.1. The Alaska Longline Fishermen's Association (ALFA) has been heavily involved in SEASWAP's efforts. Other Alaska fishing interests, such as the Central Bering Sea Fishermen's Association (CBSFA) have contributed support through funding,

[30] http://www.dfw.state.or.us/mrp/shellfish/commercial/crab/index.asp
[31] http://app.leg.wa.gov/WAC/default.aspx?cite=220-52-049
[32] www.seaswap.info

demonstrating the belief that tools developed for sperm whales in Southeast Alaska can help sablefish fishermen in other areas tackle the depredation problem posed by both sperm whales and killer whales[33].

Whale deterrence technology generally breaks down into two categories: acoustic deterrents and physical catch protection. Depredation mitigation research also includes the identification of whales and their social groups, as evidence suggests that depredation is a learned and socially transmitted behavior (Fearnbach 2014, Schakner 2014). Sections 4.7.2 and 4.7.3 discuss approaches including sound wave technology, decoys, umbrella nets, "spiders", "socks", and modifications line length and hauling speed.

4.7.1 Southeast Alaska Sperm Whale Avoidance Project (SEASWAP)

SEASWAP's major cooperative research initiatives include whale identification, genetic sampling, location tracking, testing of acoustic deterrents, and understanding the connection between fishermen's behavior and their experience with whale depredation.

Several efforts are building towards identifying the population of sperm whales that tend to depredate on HAL gear in Southeast, particularly around Chatham Strait. As stated above, understanding the depredating population is important, in part, because scientists believe that depredation behavior can be learned through social transmission (*ibid.*). Skippers take SEASWAP staff on fishing trips to photograph whales that are present during gear setting and hauling, amassing a record of fluke and body markings that can be referenced against a catalog of known whales. At the start of the 2014 field season, the catalog contained 110 identified individuals. The number of "new whales" reported each year has been declining, suggesting that the catalog is approaching the full identification of whales that spend time in the fishing area. SEASWAP and cooperating fishermen collect tissue samples from whales that are spotted around fishing gear, either through darting or dip-netting tissue that whales slough off on the ocean surface when they dive. Tissue samples are analyzed at the Southwest Fisheries Science Center (SWFSC). Twenty-six samples have been collected and analyzed so far. All samples came from male sperm whales, half of which were "known" individuals in the photo catalog. Genetic sampling will further the understanding of the depredating population's size and social/familial relationships, which could pair with information about individual whale movements to give fishermen a better idea of where the whales are and where they will be.

SEASWAP deployed satellite tags on 10 male sperm whales in 2007 and 2009 (Straley 2014). The 2014 field season yielded tags on two depredating sperm whales in the Chatham Strait, as well as two photo identifications of whales that were tagged in 2010. Tracking whale movements helps fishermen avoid hotspots that are repeatedly visited by known depredators. In order to preserve battery life, tags are switched to a mode that transmits less frequently as whales move farther away from the SE Alaska fishing grounds. The longest running tag, as of March 5, 2015, has been transmitting for 164 days. The project's website currently features map tools that show the location of tagged whales[34]. Whale locations are updated on ALFA's website daily, and provided to ADF&G and Petersburg Vessel Owners Association (PVOA). SEASWAP has sought funding to create a real-time network of whale location that fishermen can access while at sea.

SEASWAP has also conducted research on passive acoustical monitoring (PAM) of whales, aiming to better understand what attracts them to fishing vessels and how they key in on gear hauls. The project has experimented with different hydrophone set-ups, and found that attaching monitors to the longline gear itself (on the anchor line) is an effective lower-cost option than setting up individual monitoring stations

[33] CBSFA has conducted several tests using recorders to detect whales in the Bering Sea, but have not yet successfully recorded during times when whales were present. CBSFA intends to do additional research specific to the Bering Sea in 2015 or 2016.

[34] http://seaswap.info/mapping/

(Mathias 2013). The two main research areas are (1) identifying acoustic outputs from fishing vessels that may provide long-distance "cues" that attract whales to fishing activity, and (2) validating whether distinctive "creak" sounds can be used to quantify and measure depredation rates, using both bioacoustics tags and statistical comparisons between visual and acoustic depredation estimates during Federal sablefish surveys. PAM is also being used to study the use of an acoustic decoy as a potential countermeasure, transmitting acoustic cues to attract whales away from true fishing activity[35]. PAM has also been used to test the efficacy of acoustic, mechanical, and chemical deterrents on false killer whales and pilot whales that depredate on tuna in the Coral Sea and Tasman Sea off of Australia (McPherson 2004).

The project partners with fishermen through a logbook program. Fishermen log whale sightings and interactions with fishing gear, reporting the number of mutilated fish or other depredation signs such as bent hooks. Fishermen include information about where and how they were fishing, the gear they were using, their vessel type, hull type, electronics, and hydraulic system. This information is submitted to ALFA, and a summary report that correlates fishing practices and depredation outcomes is provided to researchers. The logbook effort has identified a population of 90 male sperm whales that regularly visit the Southeast fishing area and are highly likely to depredate when present. Logbooks have also helped determine that there is a seasonal component to depredation, with lower rates early in the season (March) and the highest rates in the summer months. One finding from the depredation logbooks suggests that simply relocating to avoid whales is a strategy with limited upside. The "Research/Findings" page on SEASWAP's website[36] states that sablefish catch rates are still higher in the presence of depredating sperm whales than in areas where no whales are present. The finding suggests that both whales and fishermen know where to find sablefish, and that running from whales would lead fishermen to areas where their target fish are more difficult to find.

SEASWAP's website lists six depredation reduction recommendations that will be tested over the next two years: minimize engine cycling (going in and out of gear) while hauling gear, as engine noise is observed to attract the whales; deploy decoy anchor lines that have no fishing gear attached; use low-cost acoustic hydrophones to monitor for whale presence before setting gear (available models can detect whales up to a distance of 10 nm); test fishing gear with acoustic reflectors and shortened gangions; shift fishing effort into low-depredation times of year; and retain all offal onboard until the end of the haulback, so as not to attract whales any further.

4.7.2 Acoustic Deterrents

Industry and researchers have tested both passive and active forms of acoustic deterrence. Active deterrents introduce something foreign or negative into the environment, such as a disturbing sound frequency that drives whales away from the fishing vessel. Alternatively, sounds emitted at a specific frequency can block whales' physical ability to echolocate and find the hooked sablefish. Passive deterrents are less aversive; they typically do not emit a sound, but rather are designed to confuse the whales by their presence.

One example of passive deterrence is attaching acrylic lucite beads to gangions. Beads are designed to reflect a whale's echolocation signal in the same manner as a hooked fish would. A whale that tries to feed on the beads would not be rewarded, and might learn that approaching the gear is not beneficial. This relatively low-cost method has not been extensively tested, so its effectiveness is unknown. A protective

[35] SEASWAP provided a manuscript of a journal article submitted for review by *ICES Journal of Marine Science*, "Cues, creaks, and decoys: using passive acoustic monitoring as a tool for studying sperm whale depredation." Authors: A. Thode, D. Mathias, J. Straley, V. O'Connell, L. Behnken, D. Falvey, J. Calambokidis, R. Andrews, J. Liddle, and P. Lestenkof.

[36] http://seaswap.info/study/

metal wire ring – a type of physical catch protection, described below – was successfully tested in the Florida king mackerel troll fishery. Part of that device's success is attributed to passive acoustic deterrence, as the metal ring backscatters the echolocation clicks of depredating bottlenose dolphins and modifies the dolphin's image of its target (Zollett and Read 2006). Other studies suggest that the use of metal in catch protection devices has additional acoustic deterrence benefits (Nishida 2007).

One example of an active deterrent is the OrcaSaver, developed by the Dutch company SaveWave and the Norwegian gear manufacturer Mustad Autoline. The OrcaSaver is submerged by a deck crane next to the vessel during gear retrieval; groups of transducers emit a series of complex omni-directional broadband signals at high intensity levels, with the most intense sound pressure aimed at the hauling line. Experience with the product seems to indicate that it is effective up to a range of around 30 meters. Product guidance cautions fishermen not to over-use the device, since whales are intelligent and can habituate to the sound signals. Experimentation on a captive false killer whale (*Pseudorca crassidens*) has shown that whales can improve their echolocation performance by up to 85 percent compared to a baseline after repeated experiences around an acoustic deterrent device (Mooney et al. 2009).

The forthcoming OrcaSaver model will be the third generation. Each new version attempts to make the signals more complex and unpredictable. As fishermen and product developers collect more information, area-specific or pod-specific signals can be developed to combat habituation to older sound signatures. SaveWave's product summary notes that the sounds do not harm marine mammals, as evidenced by the animals' persistence and habituation over time. Skippers and the company's marine biologist have observed that killer whales tend to retreat to several hundred meters away from the device. To prevent unnecessary sound exposure beyond what is required to move the whales off of the fishing gear, the device is designed to "ramp-up" its signal gradually.

Mustad representatives estimate the price of the current OrcaSaver model to be around $60,000. The unit's lifespan is guaranteed to be at least 500 hours, but should perform for over 1,000 hours with good care. Again, the device is only deployed in the presence of depredating whales, so it would not be used on every haul. One Alaska longline participant stated that his vessel has used the device for roughly 300 hours over the course of four years. That participant reported, anecdotally, that the OrcaSaver has been an effective investment for the vessel. He estimated that the cost of the unit would be justified by saving around 19,000 round pounds of sablefish, and he believes that his vessel saves at least that amount in each year of use. By contrast, a field study on methods to reduce killer whale depredation in the Crozet Archipelago Patagonian toothfish fishery (Southern Indian Ocean) concluded that acoustic deterrents were ineffective against killer whales (Guinet 2014). It seems clear that results vary, but that acoustic deterrence is unlikely to be a singular solution.

The device manufacturers are continually developing new models to enhance durability and effectiveness, and they seek feedback on "best use practices" from fishermen who use the gear. Fishermen are still experimenting with the best timing for submersion and optimal frequency settings, given at-sea variables such as wave action and whale proximity. Both skippers and the manufacturer acknowledge that the device is not 100 percent effective, and do not believe that a perfect acoustical solution exists. Efficacy seems to vary by area, and performance is sometimes affected by wave conditions, weather, and the availability of other food sources. Success depends on properly timing submersion of the device with whale sightings, and the use of sound setting while hauling gear.

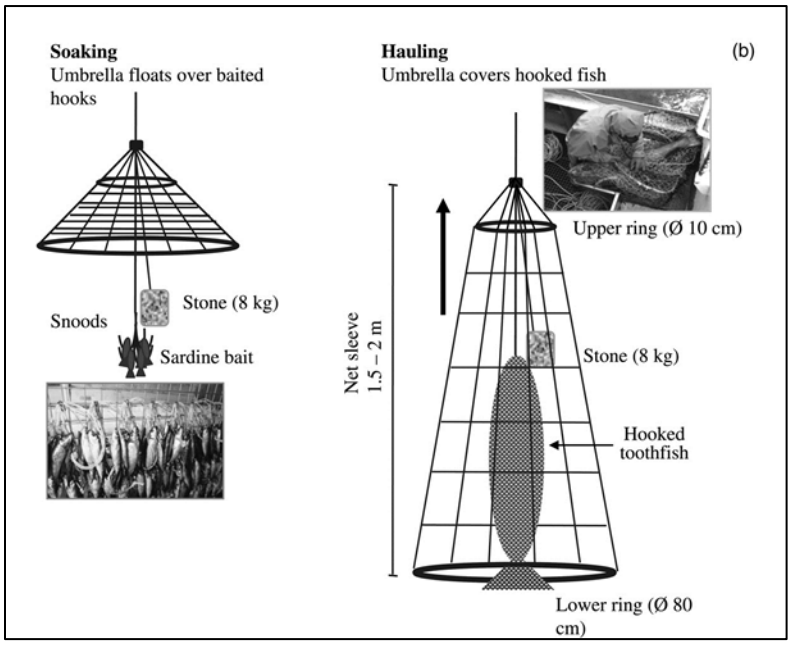
One peer-reviewed journal article recounts the use of an early version of the OrcaSaver device being used to deter bottlenose dolphins from Spanish mackerel gillnets in North Carolina (Waples et al. 2013). The study found that dolphins approached with fishing nets less often, but did not stop interacting completely. The study also found that dolphins echolocated more often in the presence of the deterrence device, and using more echolocation could actually improve the dolphins' ability to detect and avoid the nets.

SaveWave and other companies are developing devices that could serve as a compliment or an alternative to OrcaSaver. One such device is an acoustic startle response (ASR) trigger, or SoundGun. This device would be smaller and would require more targeted use on the part of the vessel crew. An operator could send out up to six pulses per minute until a marine mammal leaves the hauling area. The ASR signal would have a very short "rise and fall" time and a short pulse duration. Similar to the OrcaSaver, the SoundGun has a frequency that is tuned to a killer whale's hearing sensitivity (around 20 kHz). A product along these lines has been tested at salmon farms in the Netherlands and Scotland where operators are trying to deter harbor seals and grey seals. Both species have exhibited a flight response. Reports on the efficacy of these smaller acoustic deterrents suggest that small devices placed along the actual fishing line is a direction for future research; the analysts did not locate any information about that type of device configuration being used in the field at this point.

4.7.3 Physical Catch Protection

Some fishermen outside of Alaska have experimented with reducing longline depredation by physically separating the hooked fish from depredating marine mammals. The logic for this is similar to the logic for using pot gear. Figure 35 depicts an "umbrella-and-stone" set-up, also known as a "Chilean longline", which has been tested in the Southwest Atlantic Ocean longline fishery for Patagonian toothfish. Similar "net sleeves" have also been used in Ukraine and Chile. A buoyant net sleeve is attached to a ring fixed above each hook; the net's positive buoyance keeps it floating away from the hook so as not to impede the target fish from reaching the bait. Momentum causes the net sleeve to slide down over the hooked fish when the fishing line is hauled back during gear retrieval, when most depredation is thought to occur. The "stone" part of the system reduces the amount of time that hooked fish or bait is floating near the surface during gear setting and hauling; this measure is primarily intended to lower the likelihood of seabird interaction with the fishing gear. A 2011 study on the toothfish fishery concluded that this set-up was highly effective in preventing depredation, but also significantly reduced target catches (Goetz et al. 2011). The same study described the material cost of umbrella nets as relatively low, especially if fishermen build the nets themselves. The authors of *this* analysis would note that time costs to fishermen could be quite high to build and set up the many hundreds if not thousands of nets it would take to cover all the hooks on an Alaskan longline operation.

Figure 36 Diagram of "umbrella-and-stone" whale and seabird deterrence device (Source: Goetz et al., 2011)



Rabearisoa et al. (2012) write about testing "spider" and "sock" devices to mitigate toothed whale depredation on tuna longline fisheries in the Seychelles (Indian Ocean). The devices are shown in Figure 36. The spider has eight polyester stands, or "legs" that attach to a 100 mm diameter plastic disc through which the hooked gangion is inserted. The legs clamp down around the fish after its bite triggers the device. The sock is made of either fiberglass mosquito netting or propylene fiber netting. A metallic or plastic hoop is set at the base of the net to keep it open, and the hooked gangion is inserted through an opening. The net comes down over the fish, hiding it and protecting it from whales, when the fish's bite triggers a pin; weights are attached to the hoop to help it deploy more quickly. These devices are designed for pelagic fisheries, where the threat of depredation is not limited to the time that gear is being hauled into the boat. The authors noted that whales and sharks still depredated on hooked fish when they were covered by the devices. The number of observations was not enough to make a statistically significant conclusion, but "the insignificant result […] implies that [the devices] did not significantly reduce depredation" (p.61). The paper also suggests that depredation rates might rise further as depredating mammals habituate to the new gear. Moreover, positioning these devices along the fishing line was time consuming for fishermen. The authors did cite a trial in the Florida king mackerel troll fishery where a triggered metal wire ring was successful in preventing interaction with bottlenose dolphins.

Figure 37 "Spider" (left) and "Sock" (right) depredation mitigation devices tested in tuna longline fisheries in the Seychelles in the Indian Ocean (source: Rabearisoa et al. 2012)

Shortening the length of gangions or of the longline overall could also fit into the broad category of physical catch protection, as it is an attempt to make it more difficult for depredating whales to take fish off the line during hauling. Longer longlines with more hooks allow whales to have a greater impact on catch when present. Fishermen have also tried hauling the gear in at a faster speed. These approaches have been tested in the Patagonian toothfish fishery in the Crozet Archipelago. These measures reduced depredation rates in that fishery, but create additional costs by increasing trip length and fuel consumption (Guinet 2014 and Tixier 2014).

4.8 Analysis of Impacts: Alternative 1 (No Action)

The "no action" alternative would leave in place the gear restriction that prohibits the use of pot gear (in any configuration) for the directed fishing of sablefish IFQ in GOA management areas. Hook-and-line (HAL) longline would remain the only legal gear type for directed fishing the GOA sablefish fishery.

Gear restrictions are currently used as a management tool in selected GOA areas. For example, pot (single and longline) gear is currently prohibited in the sablefish IFQ fishery in all GOA areas. Gear restrictions

have been used to protect the directed fishery resource, to reduce the magnitude of incidental catch, and to disperse effort geographically.

As described in the analysis for Amendment 14 – which applied to only a portion of the entire GOA area that is considered in this action – gear conflicts between pot vessels and HAL vessels occurred in the mid-1980s. When longline gear, which is relatively lightweight, becomes entangled with heavier pot gear, the longline parts, causing the loss of some (or all) of the gear. Gear conflicts were considered likely to occur between those two gear types in the EGOA, since sablefish fishing is spatially concentrated along the narrow shelf edge. The presence of just one or two pot vessels was anticipated to effectively preempt the grounds to HAL gear, forcing HAL fishermen to move in order to avoid gear loss. Pots lost or stored on fishing grounds were anticipated to contribute to this problem[37].

The analysis for Amendment 14 noted a strong case for mitigating economic instability in Southeast Alaska communities that rely on the sablefish IFQ fishery. Prior to implementation of the pot prohibition in 1985, Southeast Alaska residents derived substantial income and employment in this fishery. While the fishery was also important to residents of other states, the catches of non-residents were at the level of one-fourth to one-third of the total sablefish harvest in 1984. Still, most non-resident longline fishermen delivered their catch for processing in Southeast Alaska. This is generally still true today.

In the 1980s, all of the pot gear sablefish catch in the EGOA was taken by non-residents. The Council considered and rejected alternatives that would have prohibited pots in each of the GOA subareas (east of 147° W. longitude, east of 159° W. longitude, and east of 170° W. longitude). That analysis noted that such a designation would have required vessels from out of state to travel farther to fish in the CGOA and WGOA than if the EGOA were available to them. The Council noted the possibility of differences in catch rates between the areas, which could affect the cost of operation (positively or negatively) of pot vessels[38].

Ultimately, the Council's preferred alternative under Amendment 14 identified a HAL-only area east of 147° W. longitude, with 5 percent of OY reserved for a trawl bycatch. Area-by-area distributions of the OY in the CGOA (147° to 159° W. longitude) and WGOA (159° to 170° W. longitude) were allocated in the following percentages: 55 percent to HAL fleet, 25 percent to pot fleet, and 20 percent to trawl fleet. The sablefish pot fishery was phased out in the CGOA and WGOA over one- and three-year periods, respectively. As the pot fisheries were phased out, that portion of available harvest was allocated to the HAL fleet.

At present, trawl gear is not permitted in the SEO district, and directed sablefish IFQ fishing is restricted to HAL longline gear. Trawl gear is permitted in the CGOA and WGOA areas, but sablefish is not a directed trawl fishery (in other words, a portion of the GOA sablefish TAC is set aside for the trawl sector to take as incidental bycatch, and retention during a given trip is limited by an MRA).

[37] In speaking to participants engaged in the sablefish IFQ fishery in the SEO management area of the GOA, the analysts were informed that removal of lost pot gear took years to complete following the implementation of Amendment 14. By contrast, members of the Sablefish Gear Committee commented that conflicts with lost and stored pot gear in the BS and AI areas have not been an onerous burden, perhaps because of the different physical nature of the fishing grounds in those areas, or because of the lesser spatial concentration of fishing effort in those areas. With caution, it is assumed that gear conflicts would be a greater impediment to fishing in the eastern areas of the GOA.

[38] The analysis for Amendment 14 was complicated by issues related to the Americanization of the sablefish fishery, and to overcapacity by an influx of new entrants to the fishery who were using new gear types in this fishery, leading to shorter seasons. The Council also considered and rejected designating pot only areas in the GOA and setting a ceiling on the number of vessels harvesting sablefish (by gear type) and a license limitation or comprehensive effort management program. Those issues were addressed separately under Amendment 23, which created the sablefish (and then the Pacific halibut) IFQ Program.

HAL sablefish effort is limited by IFQ, derived annually from individual quota share (QS) holdings, and in most cases the IFQ holder must be on board the harvesting vessel. There are no limits on the number of hooks that a vessel can deploy in a longline configuration. Halibut may be retained by HAL operators targeting sablefish, so long as they possess the halibut IFQ necessary to cover the catch, though the two species are typically found at different fishing depths. Table 22 shows the amount of halibut retained in the GOA sablefish IFQ fishery (with HAL gear) during recent years.

4.8.1 Effects of Whale Depredation

Depredation on sablefish HAL sets is known to occur in the BSAI and GOA IFQ fisheries. Killer whale interactions are most common in the BSAI and the western parts of the GOA, while sperm whale interactions are most common in the central and eastern parts of the GOA. Section 3.4.1.1 provides the most recent available information on whale depredation in this fishery, and Figure 17 shows a map of depredation by the two predominant whale species on longline surveys. While depredation events are difficult to observe, fishery participants have testified that depredation continues to be a major cost to the sablefish IFQ fishery, and appears to be occurring more frequently. Industry groups have tested gear modifications to limit the impact of whale depredation on HAL catch per unit effort (CPUE), and have reported those efforts to the Sablefish Gear Committee. Nevertheless, depredation continues to force fishermen to endure lost catch, spend time waiting out whales before hauling gear, or spend time and fuel relocating to avoid whales (Peterson and Carothers 2013). A summary of efforts to mitigate whale depredation in Alaska and elsewhere is provided above, in Section 4.7. Measures taken to avoid depredation reduce fishing efficiency through variable operational costs (fuel, labor) and through the opportunity cost of time lost that would have been available for additional fishing effort or dedicated to other fishing and non-fishing activities. Fishermen operating in the WGOA and the BSAI reported waiting on average at least 12 hours and/or steaming in excess of 25 nm to avoid depredating killer whales (*Ibid.*).

Because the sablefish IFQ fishery is quota-based, the key cost of depredation to fishermen is the cost of the additional time and bait required to catch the same amount of fish. Gear damage from depredation is also a direct cost. In a study conducted with six longline vessels operating in the WGOA and BSAI areas during 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 sablefish on killer whale depredated sets was estimated to be approximately $433 (± $147) per set for additional fuel alone (not including additional crew, bait or opportunity costs) (Peterson et al. 2013). The estimated reduction in CPUE for depredated sets in that area ranged between 35 percent to 69 percent for observed sets during the time period from 1998 through 2012 (Peterson et al. 2014). Estimated fuel costs associated with those sets were 82 percent higher. The study published in 2014 estimated opportunity costs of time lost to fishing at $522 per vessel-day[39].

4.8.2 Use of Pot Gear in BSAI Areas

Pot gear is currently permitted for the sablefish IFQ fishery in the BS and AI areas. Pots are typically deployed in a longline configuration, which reduces the likelihood of lost gear and is said to reduce the amount of fishing grounds preempted. Though it is not required under current regulation, the Sablefish Gear Committee and the USCG reported that marking both ends of the pot longline string is the prevailing industry practice. Use of neutrally buoyant ("floating") groundline is also reported to be commonplace. Fishing gear is expensive to purchase and replace, so participants have a private incentive

[39] This study also examined the impacts of killer whale depredation on trips targeting halibut and Greenland turbot.

to incur small additional costs in order to reduce the likelihood of gear conflicts, or increased chances of gear retrieval in the case of a hang-up. Moreover, fishermen often operate in proximity to one another over many fishing days and seasons, so the avoidance of conflict between individuals has both a private and a social benefit. A study of pot use in all BSAI fisheries, covering 1999 through 2005, showed that soak times – the amount of time that gear is left baited on the grounds before retrieval – were typically on the order of one to three days. Ninety percent of pots were soaked for seven or fewer days (Figure 8).

Use of pot gear in areas where it is permitted has increased in recent years, at least in part due to depredation concerns (see Table 20). In 2007, pot gear accounted for 81 percent of the BS fixed gear IFQ catch, and 56 percent of the AI catch. Since then, the number of sets recorded in logbooks as having used pot gear has continued to increase in the BS and has remained consistent in the AI. The average number of pots used in each longline set was 78, though it is relevant to note that the vessels fishing in those areas are typically larger than the vessels that fish sablefish IFQ in some areas of the EGOA.

4.8.3 Existing Management and Regulation Applicable to Pot Gear

Gear Retrieval and Gear Marking

Current (status quo) regulations allow for gear to be left on the fishing grounds. However, fish caught in that gear would be required to be discarded if the gear is hauled after the fishery has been changed to closed or non-retention status. Exemptions from any existing gear removal requirements on account of vessel safety concerns are already addressed in the GOA Groundfish FMP (Section 3.8.2.3 – Vessel Safety). The aforementioned requirement to discard fish if the status of the fishery has changed may not apply if the gear was temporarily left on the grounds due to a vessel safety issue.

Buoys that mark fixed gear must display either the vessel's ADF&G number or the IFQ permit holder's FFP number.

Gear Storage

The State of Alaska has existing regulations that allow pot gear to be stored in state waters in the GOA area, though obviously those pots have not been used for sablefish IFQ fishing. The owner or operator of a vessel that is registered for a state-waters Pacific cod season may store pots in water less than a certain depth (typically 25 fathoms) in designated areas in Prince William Sound, Cook Inlet, Kodiak, Chignik, South Alaska Peninsula, and BSAI areas[40]. Permission to store pots in these areas only applies to a certain number of days before and after the opening/closure of a specified state-waters fishery. State of Alaska regulations do not permit pot storage in SE Alaska, and action by the Board of Fisheries would be required to allow it.

Gear Definition and Specification

Regulations at §679.2 define pot gear that can be used for groundfish fishing. No distinction is made between single pot and pot longline configurations. There is no unique definition of a "sablefish pot" in existing regulations. Each pot must be equipped with a biodegradable panel of at least 18 inches in length that is parallel to, and within 6 inches of, the bottom of the pot, and is sewn up with untreated cotton thread of no larger size than No. 30. Each pot must be equipped with rigid tunnel openings that are no wider than 9 inches and no higher than 9 inches, or soft tunnel openings with dimensions that are no wider than 9 inches.

[40] See State of Alaska regulations at: 5 AAC 28.232, 28.332, 28.432, 28.532, 28.571, and 28.632.

Vessel Safety

The following describes only a few of the existing safety measures that apply to commercial fishing vessels in the GOA, as informed by fishery representatives of the USCG.

Commercial vessels that are greater than 79 feet LOA must have a "stability book", developed by a naval architect or another qualified individual, detailing the various loading conditions and capacities that pertain to that vessel. The USCG may conduct dockside exams to check that these larger vessels have documentation that stability tests were completed. Stability tests are reported to cost upwards of $5,000, and may vary depending upon the provider. Based on information reported in Section 4.5.2 of this analysis, most of the vessels that would be regulated by this considered action are below the size class that would require a stability report and instructions.

All commercial vessels are subject to stability standards stating that vessels may not have instability resulting from overloading, improper loading, or lack of freeboard. A vessel's voyage may be terminated if any of those improprieties are found, before or after leaving port. A vessel with less than 6 inches of freeboard amidships may be considered to be operating in an especially hazardous condition, and would not be allowed to leave port.

4.8.4 Management and Enforcement Considerations for Alternative 1

Currently, NMFS interfaces with the GOA HAL IFQ fishery for sablefish through four programs: (1) NMFS Inseason Management receives daily fishing reports from the fleet and monitors sablefish harvests; (2) the Observer Program monitors and samples the harvest of GOA sablefish fishery participants with observer coverage; (3) the NOAA Office of Law Enforcement (OLE) monitors the fleet and, along with the U.S. Coast Guard, enforces NMFS regulations; and (4) the International Pacific Halibut Commission (IPHC) accounts for incidental halibut catches in the sablefish fishery.

NMFS Inseason Management monitors HAL sablefish IFQ fisheries in several ways. The sablefish fishery is monitored using ADF&G landing report information (a.k.a., "fish ticket") reported by the processing plant when a catcher vessel delivers its catch. Fish tickets provide information about the gear type used, the area fished, and the quantity of target and non-target species delivered. Catcher-processor vessels are required to submit landing reports via eLandings. All GOA processors that take deliveries from IFQ fishing vessels are required to submit landing reports via eLandings. Fish tickets are considered self-reported or industry-reported information. Inseason Monitoring also uses data collected through the Observer Program. These data include fishing location, effort, and harvests of sablefish and non-target species, collected by observers.

The Observer Program has the authority to place an observer aboard vessels participating in the GOA sablefish IFQ fishery. The vessels participating in this fishery now fall into the trip-selection pool, but in 2013 and 2014, they were in the partial coverage category (either trip or vessel selection), and prior to 2013, they were not observed. In 2015, NMFS proposes two trip-section strata that will affect the sablefish IFQ fishery:

- Small vessel trip-selection: This pool is comprised of catcher vessels that are fishing HAL or pot gear and are greater than or equal to 40 feet but less than 57.5 feet LOA. The vessels in this stratum were in the "vessel-selection" pool in the 2013 and 2014 Annual Deployment Plans (ADP).

- Large vessel trip-selection: This pool comprises three classes of vessels: (1) all catcher vessels fishing trawl gear, (2) catcher vessels fishing HAL or pot gear that are also greater than or equal

to 57.5 feet LOA, and (3) catcher-processor vessels exempted from full coverage requirements. The vessels in this stratum were termed the "trip-selection" pool in the 2013 and 2014 ADPs.

Selection probabilities will be 12 percent for small vessel trip-selection stratum and 24 percent for large vessel trip-selection stratum. NMFS will grant a conditional release in 2015 to a vessel in the small vessel trip-selection stratum under two scenarios: (1) the vessel does not have sufficient life-raft capacity to accommodate an observer, and (2) the vessel is selected for a third consecutive trip with observer coverage (NMFS 2014).

Observers record a vessel's total fishing effort (time gear was fished, location fished, and amount of gear fished), which is obtained directly from the captain's logbook. If a logbook is not required, then the observer obtains this information by asking for assistance from the captain. Regardless of the data source, observers spot check the effort information they are provided against their own observations. Observers collect species composition information from a random sample of the sets. They also collect length, sex, and age structure information from various target and non-target species. When halibut are encountered in the sampled set, the observer completes halibut injury assessments from a random subset. Information from observed vessels is used to extrapolate catch and effort information to the unobserved portion of the fleet. Observers report potential violations to Observer Program staff; those observations are then shared with the appropriate agency for review. Observers are also trained to inform the captain of the vessel of any potential violations that they witnessed, if it appropriate to do so.

The OLE monitors the sablefish IFQ fishery on a regular basis, conducts random dockside inspections in ports throughout the GOA, and enforces NMFS regulations. The OLE uses logbook information during dockside vessel inspections to verify landings. NMFS requires daily fishing logbooks (DFL) to be completed by catcher vessels with a Federal Fisheries Permit (FFP) that are greater than or equal to 60 feet (18.3 m) LOA. Catcher-processors with a FFP that fish sablefish IFQ are also required to report daily using a daily CP logbook (DCPL) and eLandings. Upon approval of the Regional Administrator, NMFS-approved electronic versions of the logbook forms may be used. NMFS logbooks serve as a record of the location of gear set, the number of sets, and the harvest and discard of target and some non-target species by set.

OLE does not have the personnel, vessel, or fiscal resources to conduct at-sea inspections. The USCG is responsible for conducting at-sea fisheries law enforcement boardings onboard vessels participating in the sablefish IFQ fishery. At-sea boardings are conducted at random or in response to specific intelligence of suspected possible violations or inconsistencies provided by OLE. Boarding teams conduct enforcement of NMFS regulations at-sea to include, logbook inspections, documentation checks, and limited gear inspections (gear is inspected on deck, and thus deployed gear is not directed to be retrieved for inspection). Following these at-sea boardings, the USCG forwards any suspected violations complete with documentation and evidence to OLE for further investigation. The OLE may make random spot checks of the gear, but typically this would be done dockside and not while the vessel is actively fishing. Given OLE resources and other priorities, a relatively small number of vessels are checked for gear specification. The OLE also may conduct limited monitoring and enforcement activities through at-sea boarding in coordination with the USCG and Alaska Wildlife Troopers.

The International Pacific Halibut Commission (IPHC) accounts the incidental halibut catches in the sablefish IFQ fisheries. Regulations allow halibut harvested incidentally in the sablefish IFQ HAL fishery to be legally retained if the operator or another individual aboard the fishing vessel possesses halibut IFQ. IPHC requires logbooks be completed and submitted for vessels that are 26 feet (7.9 m) and greater in LOA fishing for halibut IFQ. Catcher vessels and CPs that participate in both the groundfish fishery and the IFQ sablefish or halibut fishery during the same fishing year are allowed to submit a single combined NMFS/IPHC logbook. The IPHC has a strict policy concerning the release of any logbook data, due to the

confidentiality of the information. Specific location data identified to vessel are not provided to individuals outside the IPHC. Data are published by aggregate, larger geographic areas and require the combination of data from three or more vessels. IPHC logbooks are protected from seizure or subpoena. If OLE asks for individual logbook information, the request is made in writing to the Director and the individual cases are reviewed. The IPHC works closely with enforcement, but the IPHC provides information in the aggregate form or answers specific questions without releasing individual logbooks.

4.9 Analysis of Impacts: Alternative 2

The Council selected parts of Alternative 2 as its preferred alternative. This section represents the general cost-benefit analysis of Alternative 2, as it was available to the Council and the public at the time of final action. Section 4.10 provides the Council's rationale for choosing certain options within the elements of Alternative 2. Due to the complexity of developing regulations for a new gear type, and the Council's stated interest in ensuring that regulatory language is clear, but not overly prescriptive in regard to gear and technology specifications, NMFS provided draft regulatory language at the public review stage. That draft language has not been revised but remains woven into this section as record of the information presented to the Council to assist in development of a preferred alternative. Final regulatory language for the Council's preferred alternative is not included in Section 4.10, since it will be included separately in the proposed rule package that NMFS forwards to the Secretary for consideration.

Alternative 2 would allow the use of pot longline gear in the GOA sablefish IFQ fishery. The use of pot longline gear in that fishery would be consistent with the allowance of pot gear in the BSAI sablefish IFQ fisheries[41]. The action alternative includes four elements. Elements 1 through 3 would further regulate the use of pot longline gear by limiting pots in number (pot limit), in operational manner (gear retrieval), or by requiring certain gear specifications (marking at both ends of a set, use of technology that helps the fleet track the location of gear on the fishing grounds). Element 4 would maintain operational efficiency within the IFQ fishery by allowing fishermen using pot longline gear to retain IFQ halibut caught incidentally while targeting IFQ sablefish, subject to restriction, as they may when using HAL gear. As noted above, the Council did not include all options under Alternative 2, as it was analyzed for public review – in its preferred alternative. Options such as the requirement to use technology that tracks fishing gear location are discussed in this section, but were not ultimately selected. Analysis of those options is maintained in this document as record of the Council's considerations.

The Council's purpose and need statement for this action (Section 4.2) calls for a reduction in whale interaction with the fishing gear used to target GOA sablefish. The statement outlines three first-order considerations for weighing the action alternative against the status quo (Alternative 1). First, the Council is seeking an alternative that would mitigate the reduced CPUE and increased fishing costs (direct and indirect) that are attributed in part to whale depredation off of HAL gear. Second, the Council acknowledges that depredation off of HAL gear constitutes unaccounted mortality in the sablefish stock. Mortality from whale depredation has a direct negative impact on the sablefish stock, but the inability to account for this mortality (assumed to be greater than natural sablefish mortality due to whale predation) increases uncertainty in the sablefish abundance indices that are critical to sound management. Third, the Council is seeking an alternative that would provide continued, equitable fishing opportunities for harvesters who do not choose to switch to pot longline gear, minimizing the likelihood and severity of excessive grounds preemption, gear conflict, and consolidation in the GOA sablefish IFQ fleet.

Many GOA communities, especially those listed in Table 42 as highly engaged in or reliant upon the regulated fishery, depend upon the continued presence of a robust and diverse sablefish fleet. This list of

[41] Single pots are less preferred in the BSAI fisheries due to the increased likelihood of gear loss and the additional grounds preempted by their use. (Hanselman et al. 2014)

communities covers all four GOA areas that are potentially regulated by this action (WGOA, CGOA, WY, SEO). The communities are flagged for a variety of reasons, including the presence of sablefish processors, being home and service ports for sablefish harvesters, and being the locality where IFQ permit holders and crew members reside and contribute to the social and economic fabric of the community.

This section of the analysis considers the effects of introducing pot longline gear alongside HAL gear in the GOA sablefish management areas. The first section provides a summary of benefits, costs, and unknown factors associated with the introduction of pot longline gear. The following sections consider each element of the Alternative 2 individually, and also identify related management and enforcement considerations.

Alternative 2 was structured to give the Council the choice to restrict the use of pot longline gear to certain GOA management areas. The Council received testimony from stakeholders in the EGOA questioning whether the benefits of a pot fishery in that area outweigh its costs – neither of which can be empirically analyzed in the context of a rationalized GOA sablefish fishery. The primary concerns that were raised include conflict between pot longline gear and HAL gear, and grounds preemption by pot longline fishermen who are more able to occupy preferred fishing grounds for extended periods of time. The Council's preferred alternative, described in Section 4.10, reflects this stakeholder input by recommending differential pot limits and gear retrieval requirements by management area. Permitting pot longline gear usage in only selected areas might dissuade operators who harvest in multiple areas from investing in pot longline gear and the attendant vessel retrofits. A stakeholder facing significant costs to turn a HAL vessel into a pot longline vessel might choose not to make that investment if it means that fishing his or her quota in a particular GOA area would require a mid-season reconfiguration. That stakeholder may instead choose to lease out his or her quota for areas in which his pot longline vessel cannot operate. To the extent that selectively approving pot longline gear across GOA areas dissuades gear switching, the choice to hold certain areas in the status quo might not further the Council's primary objective of reducing whale interaction with HAL fishing gear. Organizations located in the areas that are less receptive to allowing pot longline gear are investing time and money into alternate methods of mitigating whale depredation (see Section 4.7), but it is premature to conclude whether those efforts are, or will be, more effective than switching to pot longline gear.

4.9.1 Draft Regulations for Alternative 2

Several changes in regulations would be necessary to incorporate the action alternative into the existing management process. This section reviews considerations for management and enforcement of the four elements of Alternative 2 as proposed in the Council's December 2014 motion and reviewed at final action in April 2015 (see Section 4.3.1). At the time of final action, the analysis draft regulatory text based on the Councils' December 2014 motion. NMFS noted that the draft regulations included in the Analysis in April 2015 to assist the Council in developing a preferred alternative for final action. With the Council having selected a preferred alternative, NMFS has reevaluated the draft regulatory text presented to the Council in April 2015 and determined that substantial revisions are necessary to reflect the Council's preferred alternative. The draft regulatory text has been removed from this analysis because it is no longer applicable. The proposed rule was published on August 19, 2016 (81 FR 55408) and is not repeated here.

4.9.2 Benefits and Costs of Allowing Pot Longline gear

This subsection first considers the extent, if any, to which pot longline gear is inherently advantageous when fishing for sablefish in a GOA area where both pot longline and HAL gear are permitted. The following sections discuss the manner in which the Elements of Alternative 2 address the first order considerations for this action, as outlined in the Council's statement of purpose and need. Management

and enforcement considerations that are specific to each of the four Elements are discussed within the appropriate subsections. As noted above, this section analyzes the elements of Alternative 2 as they were written when the Council took final action to recommend a preferred alternative in April 2015 (see Section 4.3.1).

Overview

The Council and industry committees have noted potential benefits of pot longline gear for sablefish fishing that include: mitigation of whale interaction with fishing gear, reduced mortality of seabirds, reduced bycatch of non-target fish species, reduced overall halibut mortality when targeting sablefish, and better accounting of total sablefish fishing mortality.

The potential economic and social costs of allowing pot longline gear in areas where HAL gear is also used include: the capital cost of purchasing pot longline gear and/or retrofitting a vessel, increased preemption of fishing grounds, gear conflict potentially resulting in gear damage or loss, and competitive imbalance between users of different gear types.

In some aspects, the relative benefit of pot longline gear fishing as opposed to HAL gear is either unclear or is conditional on factors that are not forecasted in this analysis. Those external factors include the local biomass distribution of sablefish in the future, changes in future product markets, and the future behavior of marine mammals (particularly depredating whales). Based on available information, the analysts are not able to definitively state whether fishing with pot longline gear would generate a higher sablefish CPUE in the GOA (noting that CPUE is likely to differ across GOA management areas), whether pot longline fishing will increase or decrease per unit ex-vessel values for sablefish, or whether pot longline fishing will reduce expenditures on bait.

Benefits

Killer whales and sperm whales are known to depredate sablefish off of HAL gear in the GOA. Evidence of whale depredation is collected from longline surveys (see Figure 17 in Section 3.4.1.1) and from fishermen's reports and participation in academic studies (Peterson et al. 2013). Depredation imposes direct costs on fishermen by reducing the number of hooked sablefish that are brought on board, and by damaging fishing gear. Fishermen's response options to depredation impose opportunity costs, which are summarized above in Section 4.8.1. Catching sablefish in pot longline gear mitigates the ability of marine mammals to depredate hooked sablefish while the HAL gear is fishing or being hauled back, improving outcomes for fishermen.

To the extent that whale depredation on sablefish is reduced, allowing the use of pot longline gear could allow managers to make more sablefish biomass available for fishing than they would have otherwise. Sablefish that are depredated off of fishing gear are not currently accounted for in stock assessments, other than as a measure of uncertainty[42]. If pot longline gear effort increases in the GOA, managers may be able to reduce the uncertainty buffers in sablefish abundance indices, which could in turn mean that TACs are marginally higher.

Fishing with pot longline gear also reduces the attraction of seabirds to baited hooks, which would reduce incidental mortality of seabirds. Seabird mortality from fishing could impose a constraint on the sablefish IFQ fleet, especially if it results in the taking of ESA-listed short-tailed albatross. Reducing the likelihood

[42] The sablefish stock assessment authors and the Groundfish Plan Team are developing methods to account for sperm whale depredation in GOA abundance estimates. That methodology is discussed in Section 3.1.

of triggering a Section 7 consultation increases fishermen's security in their ability to prosecute the fishery in which they have invested, and upon which they and other stakeholders depend.

Switching from HAL to pot longline gear is also expected to reduce the incidental catch and bycatch of other fish species, such as halibut, rockfish, skates, and grenadiers. Section 4.5.4.2 shows historical incidental catch of halibut and GOA Groundfish FMP species when targeting sablefish with HAL gear, and bycatch when fishing for Pacific cod with single pot gear (a close, if imperfect, analog). That section also includes information on halibut and groundfish catch when fishing for sablefish IFQ with pot (single and longline) gear in the BSAI, where its use is permitted. Reducing the amount of halibut and groundfish caught while targeting sablefish would increase CPUE (holding other factors equal), because every non-sablefish on a longline hook represents a lost opportunity to harvest a more valuable sablefish[43]. That increase in CPUE would be additional to what might be expected from reducing the amount of whale depredation on HAL sets. Reducing bycatch of species that are targeted in other fisheries has two other benefits. First, some fishermen who participate in the sablefish IFQ fishery might also participate in those directed fisheries. Catching the groundfish on a targeted trip, as opposed to small amounts of bycatch, might result in a better ex-vessel price if the timing of the catch is more appropriate for available markets, or if the ex-vessel buyer is set up to process more valuable product forms. Second, sablefish fishermen have a private incentive to control their groundfish bycatch, as poor bycatch performance or high discard rates could trigger future management actions that restrict their target fishery.

Halibut mortality from discards, when caught by HAL fishermen who do not possess the necessary IFQ, can reduce future stock abundance and harvestable biomass. Excessive halibut mortality is a threat to fishermen who do hold IFQ, who would like to purchase halibut QS in the future, and to the subsistence users and the communities that depend equally upon that fishery resource. If Alternative 2, Element 4 were not selected, all halibut caught while using pot longline gear would be discarded. While this is a negative outcome, the Sablefish Gear Committee commented that total halibut mortality from pot discards could still be marginally less than the unaccounted halibut mortality associated with depredation off of HAL gear. While the mortality rate for halibut that enter pots is comparatively high, fewer halibut are expected to be able to enter pot longline gear. With the selection of Element 4 (discussed below in Section 4.9.6), the preferred alternative presents an opportunity to reduce both unaccounted depredation mortality and to reduce halibut discard mortality in a pot longline fishery for sablefish.

Costs

Of the 404 catcher vessels that fished sablefish in the GOA between 2009 and 2013, only 40 deployed pot gear in another fishery (including the BSAI sablefish IFQ fishery and Pacific cod fisheries in both the GOA and BSAI). Thirty-eight of those 40 vessels were greater than 50 feet LOA, and the other two were greater than 40 feet LOA. In order to benefit from the option to use pot longline gear, and external benefits through the use of pot gear (as described above), individual vessel owners will have to make substantial capital investments in new gear and vessel reconfiguration. The following information is a coarse picture of the potential costs associated with the optional gear transition, based largely on information reported by the Sablefish Gear Committee.[44] Fishery participants' differing abilities to make such an investment is discussed below in Section 4.9.8.1.

[43] Halibut are also a high value species, but may only be retained if the sablefish fishermen on the vessel possess the necessary halibut IFQ. Halibut bycatch in excess of the IFQ held onboard the vessel must be discarded, and would constitute a clear opportunity cost in that event.

[44] This information was originally presented in the December 2013 expanded discussion paper on this action, available under Agenda Item D-2 at http://legistar2.granicus.com/npfmc/meetings/2013/12/875_A_North_Pacific_Council_13-12-09_Meeting_Agenda.pdf.

The Sablefish Gear Committee provided several anecdotal estimates of the cost for new pot longline gear. The Committee did not provide a single consensus price, partly due to the fact that line configurations (spacing, length of groundline) vary by vessel. The estimated price for a mile of pot longline gear (shackles, skates of groundline with pots attached to gangions at intervals, and other pieces of hardware that are set in the water) ranged from $6,000 per mile to $12,500 per mile. An individual might pay more or less per mile depending on how many pots are set on a given length of groundline, among other factors. These cost estimates do not include expenditures to upgrade hydraulics or line haulers, which are likely necessary for operations switching from light-weight HAL gear to heavier pot gear. Other additional gear could include an overhead hoist for lifting pots, buoys, flagpoles, heavier line anchors, and line reels (coiling pot groundline on deck might not be feasible on smaller vessel, given the line's substantially greater diameter relative to HAL groundline). Vessel modifications, such as a cut-out stern for pot launching, could cost upwards of $50,000. Vessels switching from HAL gear may also incur costs in the removal and storage of HAL gear. Noting the small amount of single pot gear currently deployed in some GOA areas, it is reasonable to assume that many participants would be in the market for new (unused) pot gear.

By comparison, the Sablefish Gear Committee estimated that a string of HAL longline gear (150 skates of auto-line gear with swivels, plus anchors, buoys, and flag poles) would cost around $100,000 new ($666.67/skate). While gear configuration varies, the Sablefish Gear Committee provided one estimate of length per HAL longline set at three miles, and 30 skates per set (10 skates/mile). Again noting the rough nature of the estimate, a new HAL longline set-up would cost around $7,000 per mile. Participants anecdotally reported that HAL set-ups for hand baited gear are likely to be shorter in length, which would affect the per-mile cost estimate.

Alternative 2 merely provides the option for participants to switch to pot longline gear, so individuals face a private decision as to how the capital costs of a new configuration balance against the costs of depredation, which are more difficult to quantify. Costs related to whale depredation include additional fuel, bait, damaged gear, and time spent harvesting the same amount of sablefish IFQ.

Even with the selection of Alternative 2, it is highly likely that a portion of the existing sablefish IFQ fleet will continue to use HAL gear, due to cost constraints, vessel size constraints, or both. One the central challenges in making a policy decision to allow pot longline gear on the grounds fished by HAL fishermen is the potential for grounds preemption and/or gear conflict. Grounds preemption occurs when a fisherman has already set marked gear in an area, preventing other participants from setting in the same area. Fishing grounds can be preempted for an extended period of time, especially when larger vessels haul and re-bait their sets in rotation until their fish hold is full and they make a delivery. Gear conflict occurs when multiple strings, skates or a set become entangled, either by setting across one another or by snagging on a buoy line. Introducing pot longline gear into a HAL area could increase the occurrence of HAL gear loss if the two gear types come into conflict, as the greater tension on pot longlines and the greater girth of pot groundlines are likely to part the smaller and lighter HAL groundline. Gear loss is inevitable to a degree, but should not be exacerbated by management actions. Lost gear preempts grounds until it is removed, and the removal of lost pots from the sablefish "derby" years took many years of voluntary effort.

The cost of grounds preemption and gear conflict is reduced fishing opportunities for vessels that are unable to, or choose not to, deploy pot longline gear. In the case of a quota-based fishery, the impact would be manifested in additional operational costs, such as traveling farther or to less productive grounds in order to harvest their IFQ. These costs are assumed to be greater in an area where the sablefish fishing grounds (i.e. the shelf edge) are narrower, concentrating gear into a smaller area. Distributional impacts on harvesters are further discussed in Section 4.9.8.1.

The analysis for GOA Amendment 14 (1985), which removed pot gear from the GOA sablefish fishery, characterized gear conflict as an extra-market form of competition, where pot fishermen engaged in gear conflict as a means to impose costs on HAL fishermen. This is no longer an appropriate description of the social environment in the (now domestic) sablefish fishery. The numbers of sablefish IFQ permit holders, has declined since the 1980s, as have the total amount of gear fished and the "footprint" of the fishery on the water. More importantly, the implementation of the IFQ Program removed the derby nature of the sablefish fishery, and provides a regulatory atmosphere in which privately negotiated agreements and conflict mediations are more achievable.

Aside from capital costs and interactions between gear types, allowing the use of pot longlines could have unintended, external effects on other fisheries that also experience interactions with marine mammals. Reducing the prey availability of sablefish on HAL gear by converting a portion of the IFQ fleet to pot longline gear could drive increased whale depredation on the gear of other fishermen. Increased depredation on the HAL gear of participants within the regulated fishery is a conceivable outcome, and the equity issues are further discussed in Section 4.9.8.1. It is also conceivable that whales could shift their depredation to the GOA longline fishery for halibut IFQ. Since depredation is only rarely accounted, information is not available to quantify the amount of existing sablefish depredation that might be shifted to the halibut fishery. While the magnitude of this effect is unknown, the potential for depredation to shift to sablefish IFQ fishermen who continue to use HAL gear is obvious enough that it is listed as a "cost", and not as an "unclear effect" (below).

Effects Unclear or Conditional

Fishing with pot longline gear is likely to reduce whale depredation when compared to fishing with HAL gear, as discussed above under "benefits". That supposition alone, however, is not sufficient to conclude that pot longline gear provides a higher CPUE than HAL gear. Comparing pot longline and HAL gear will always be an "apples to oranges" exercise, but the following information is provided to characterize the inherent catch rates for each gear type, to the extent practicable. To do so, the analysts make some assumptions about gear configuration, which is known to vary widely within each gear type, in order to normalize by the length of a gear set – which is the unit of interest when discussing grounds preemption.

Based on the gear information described above (under ***Costs***) and CPUE rate information provided in Section 4.5.4.1, the analysts conclude, for the sake of discussion, that inherent catch rates per mile of pot longline or HAL gear are equivalent within a margin of error. The Sablefish Gear Committee stated that a "typical" HAL set with a total length of three miles would be made up of 30 skates. A skate is a length of groundline that has, on average, about 45 hooks on gangions. At 10 skates per mile, a two mile set would have 20 skates; and with 45 hooks on every skate the two mile set would have around 900 baited hooks. Estimated CPUE for HAL gear varies by time of year and by whether one is using observer or logbook data, neither of which provides a full census of HAL activity. Given the estimates in Section 4.5.4.1 (and graphed in Figure 5 in Section 3.1.1.2) the analysts take 0.8 lbs./hook as a reasonable average HAL CPUE, given that it is the mean for the spring when most GOA sablefish IFQ effort occurs and it is near the mean of the annual averages for each of the four GOA subareas. Therefore, with 900 baited hooks, a fisherman might expect around 720 round lbs. of sablefish. For pot longline gear, the Sablefish Gear Committee stated that a two mile set would have between 30 and 50 pots. No sablefish CPUE estimate exists for pot longline gear in the GOA, since the gear is not allowed. However, CPUE estimates for pot (single and longline) gear in the BSAI range between 11 lbs./pot and 26 lbs./pot depending on the use of logbook or observer data (Section 4.5.4.1). Table 43 shows the rough estimates for the amount of sablefish that might be expected from a two mile pot longline string of between 30 and 50 pots, ranging from 330 round lbs. to 1,300 round lbs. Using BSAI CPUE estimates is troubling, but is the only available data. CPUE is anecdotally reported to be lower in the WGOA and BSAI areas compared to the rest of the GOA; that suggestion is supported by reported longer soak times in the west. For the purposes

of a rough estimate, it is not unreasonable to focus on the middle-to-high end of the inherent pot longline CPUE estimates in Table 43. The upper end of the estimates in the table are close enough to the rough estimate of inherent HAL sablefish CPUE (per two-mile set) for one to presume that depredation, environmental factors (e.g. location, weather, bathymetry), and fishermen's skill are among the key determinants of difference in gear performance. It is safe to assume that these non-gear determinants vary across GOA management areas.

Table 43 Estimated CPUE for GOA pot longline set of two miles in length (round lbs. of sablefish)

		Pots per set	
		30	50
Pounds per pot	11	**330 lbs.**	**550 lbs.**
	26	**780 lbs.**	**1300 lbs.**

Another CPUE-related effect of allowing pot longline gear, the direction of which is unclear, is whether or not fishing with pot longlines would shorten the length of fishing trips. If gear is required to be removed when making deliveries[45], one might assume that shorter trips lessen the negative impact of grounds preemption on other fishermen. While pot longline gear is likely to mitigate the CPUE-suppressing impact of whale depredation, the preceding discussion of inherent catch rates for the two gear types generally concludes that location and fishing skill are at least as important in determining the length of the trip. Perhaps the most important factor in determining the length of the trip and the grounds preempted is the size of the vessel. Vessel size influences the amount of pot longline strings a vessel can set on the grounds, and the size of the fish hold. Holding vessel size equal, and temporarily granting the proposition that pot longline gear inherently catches sablefish more quickly, one should also consider that fishermen might choose to soak pot longline gear for longer periods of time than they would HAL gear. A pot used to fish for groundfish must be equipped with tunnel openings to allow fish to escape, and a fisherman might leave pots in the water longer so that smaller, less valuable fish swim out of the pots. Escapement of small sablefish is not a consideration when a HAL fisherman is soaking his or her gear. In sum, the replacement of HAL gear with pot longline gear does not have a clear diminishing effect on the length of time that grounds would be preempted.

Selecting Alternative 2 would not have a clear, significant impact on ex-vessel prices in the GOA sablefish IFQ fishery. On the surface, existing data seems to suggest that sablefish caught with HAL gear fetches a higher ex-vessel price than sablefish caught with pot gear (Table 27 in Section 4.5.5). However, the available data does not include pot-caught prices for sablefish in the GOA, since there are none. Footnote 21 references a February 2014 discussion paper covering data from GOA Pacific cod fisheries, where pot-caught cod prices were much closer to those for HAL-caught cod. It is premature to say that the market for pot-caught sablefish would not change with experience and improved information on quality. Fishermen have speculated, anecdotally, on both sides of the futures for pot-caught sablefish ex-vessel value. Some individuals testified to the Council that pot-caught sablefish might be higher quality because they are less exposed to sand fleas before the gear is hauled. Others testified that pot-caught sablefish might endure more chafing in pot gear, which could reduce quality. Perceptions of quality may change over time with the evolution of fishermen's best practices, and with marketing.

[45] The considered gear retrieval requirement is further discussed in Section 4.9.4.

This analysis provides information suggesting that pot-caught sablefish are, on average, slightly smaller in size than those caught with HAL gear (Figure 6, Section 3.1.1). While this is relevant background information, the data comes from the BSAI area, so it cannot be said with certainty that gear types would exhibit the same selectivity in the GOA. Furthermore, the stock assessment authors who provided the BSAI average length and length frequency data also noted that fishing location (measured by longitude) could account for a portion of the reported size difference. The authors concluded that if both pot and HAL gear were fished in the same BSAI area, HAL gear would likely catch larger fish on average, but pot gear would still catch fish throughout the full range of lengths[46]. The difference in average length by gear type was in the range of two to four inches, depending on the set of years analyzed. Accepting, for discussion, that HAL gear might catch slightly larger GOA sablefish, the magnitude of the difference would not likely affect the ex-vessel value of the catch *per pound*. It is more likely that prices for sablefish caught with pot longline gear will be influenced by fishermen's choices about bleeding and fish handling.

The analysts have not obtained any published data that indicates whether or not sablefish pot longline fishing would require more or less expenditures on bait than fishing with HAL gear. HAL gear has a small amount of bait on each of many hooks, while pot gear would have a larger amount of bait in bags placed in each pot. Some fishermen fill pots spaced at intervals with a large amount of bait; these are often referred to as "bait bombs". Assuming that area-specific data were available to define the amount of each gear type that would need to be set in order to have the identical *expected* sablefish catch, this analysis must also assume that the amount of bait required for that gear would be similar. If this is indeed the case, then the effect of whale depredation on HAL gear (and of higher bycatch of other groundfish species) would be to unbalance that assumption of equal bait costs. However, data to support the conjecture that pot longline gear would reduce bait costs are not available.

Absent empirical data, the efficacy of HAL gear and pot longline gear in the GOA sablefish fishery is assumed to be similar. Given the reported negative impacts of whale depredation, pot longline gear would appear to be cost-saving (ignoring the required capital investment to reconfigure a HAL vessel). However, available data are not sufficient to state that pot longline gear would generate higher gross revenues, or that fishing with pot longline gear would reduce the amount of time spent on the fishing grounds. Thus, the benefits of pot longline gear are largely predicated on the potential to reduce the opportunity costs associated with whale depredation.

4.9.3 Effects of a Pot Limit, Element 1

Element 1 would establish a maximum limit on the total number of pots that a GOA sablefish vessel could fish. The analysts assume that the Council's intent is to limit the number of pots that a vessel could fish on a given trip, and that longlined pots could be divided into separate sets (or strings) at the discretion of the captain. At final action in April 2015, the Council considered pot limits that could be set between 60 and 400 pots per vessel, inclusive.

The Council considered selecting different pot limits for different GOA management areas. Management and enforcement considerations related to having different pot limits in different areas are discussed in Section 4.9.3.2, below. Considering area-specific pot limits 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. Smaller pot limits might be appropriate in areas where the fishing grounds are spatially concentrated and grounds preemption is a pressing concern, or where the local fleet has a historically participating component of small, short-range vessels lacking the capacity to deploy and retrieve longline pots or pack a large hold of

[46] D. Hanselman, 2015. Personal communication.

sablefish over many days and long distances[47]. One drawback to setting a small pot limit in regulation is that it would take further Council action and analysis to adjust an unnecessarily low limit after implementation. Limiting the number of pots reduces operational efficiency if the limit is lower than what a skipper deems optimal for his or her vessel. Relative to no limit, or a limit that exceeds what is privately optimal, a low limit might increase variable fishing costs such as fuel and time. If precaution leads the Council to set the limit exceedingly low in one area, there may be little or no incentive for vessel owners to invest in deck reconfigurations and new longline pot gear. In that case, one would expect this action to achieve less progress towards the objective of reducing whale depredation in that area through the use of pot longline gear.

A pot limit would cap the total amount of fishing grounds that any single vessel could preempt at a given time. A pot limit can also be viewed as a measure to equalize effort between vessels converting to pot longline gear and those continuing to fish with HAL gear. Under the analyzed set of alternatives (listed in Section 4.3.1), a vessel would not have to remove its longline pot gear from the fishing grounds when making a delivery, so once gear is set it could theoretically remain in that area throughout the season. (Gear retrieval requirements are further discussed in Section 4.9.4,[48] and under the preferred alternative in Section 4.10.) As a result, the analysts approach Element 1 as a measure primarily meant to limit a vessel's "footprint" on the fishing grounds. Section 4.9.2 of this analysis does not strongly establish the superiority of pot longline gear in terms of CPUE, so the purpose and benefit of a pot limit is not viewed here as a tool to directly dictate competitive balance. It should be noted that vessels using HAL gear are not limited in the amount of gear that they can deploy; however, the analysts understand that HAL gear is not left unattended on the grounds for extended periods, due to the greater threat of gear loss, deadloss, and degradation of catch.

The impact on other fishermen of preempting productive fishing grounds would be correlated with the number of pots that a vessel can set. The Sablefish Gear Committee commented that "up to 300 pots would give fishermen enough flexibility to operate as efficiently as possible without occupying too much of the fishing grounds," but no rationale was provided for that statement[49]. The December 2013 discussion paper on this action notes that 180 pots would be equivalent to the length of a HAL longline set. Accepting the Committee's estimate that pots are set roughly 50 fathoms apart (300 feet), a string (or 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 would place the number of pots fished on 12 total miles (six strings) between 180 and 300 pots. However, the Sablefish Gear Committee did not recommend, and the Council did not adopt, specifications that would be required for longline pot gear under the proposed action in order to avoid constraining individual vessel operations and in recognition that vessels using HAL gear are not limited in the amount of gear that they can deploy. Therefore, there is no regulatory maximum for the number of pots that could be deployed, and as few as two pots could be deployed to meet the regulatory requirements.

Selecting a lower pot limit could cause fishermen to turn over their pot longline gear more often. Reduced soak times could marginally reduce one of the benefits of pot longline gear – size selectivity. More time

[47] It should be noted that fishermen continuing to use HAL gear are not, and would not be, limited in the amount of gear they could set and the amount of fishing ground that they could cover.

[48] Note that under Element 2, Option 2 (as presented in the April 2015 public review draft of this analysis) the pot longline gear would have to be moved every so often (the Council is considering a maximum amount of time gear can be left without being moved ranging between four and seven days). During its December 2014 deliberations, the Council clarified that "moved" could also mean that gear is "tended", or hauled and re-set. So, even under the requirement to "move" gear, a pot longline string could essentially remain in the same area and preempt the grounds for longer than four to seven days.

[49] See the December 2013 expanded discussion paper on this action, available under Agenda Item D-2 at http://legistar2.granicus.com/npfmc/meetings/2013/12/875_A_North_Pacific_Council_13-12-09_Meeting_Agenda.pdf.

on the bottom provides smaller fish an opportunity to swim out of the pot through an escape ring. Ideally, skippers would use their knowledge of catch rates and fish size in a particular area to choose the amount of soak time that selects for larger fish, but allows them to keep rotating and re-baiting their strings of pot longline gear. If the maximum number of pots is lower than what would allow for constant gear rotation at the optimal period, fishermen would experience greater stand-down time while pot longline gear is soaked to sort for fish size.

Pot limits could be viewed as a measure to promote vessel safety. Section 4.8.3 covers existing regulations that pertain to vessel safety, and reflects that vessels less than 80 feet LOA are able to operate without documentation of loading instructions (a "stability book") developed by a naval architect. Rather, a vessel's ability to operate with a loaded deck is at the discretion of the operator, so long as the vessel has a minimum amount of freeboard (six inches). A uniform pot limit that applies to all vessels using pot longline gear in the GOA sablefish IFQ fishery is not likely to be an effective safety measure, as the number of pots that is safe for one vessel to carry could be too much for another.

Pot limits would not likely affect the amount of lost fishing gear, in the long term. Element 1 does not limit an operator's ability to replace lost gear, so limiting the amount of pot longline gear that could be deployed during any one trip would not affect the amount of pots that might be lost and replaced over time.

Pot limits would provide only a weak disincentive for vessel consolidation in the fishery, if consolidation is caused by elements of this or another management action. Consolidation would occur as IFQ permit holders stack their fishing privileges on a single vessel. Pot limits would not affect the number of trips that a vessel could make during the sablefish IFQ season. While making additional trips on a permit-stacked vessel increases variable costs, that strategy might still be more cost effective than incurring the fixed costs of fishing on two separate platforms.

Some stakeholders have testified to the Council that limiting the number of pots fished on a given string might reduce the severity of gear conflicts that occur in the fishery. A smaller number of pots in a longline string would exert less tension on a HAL string that is entangled with a pot longline during retrieval. No data are available to assess the maximum number of longlined pots that could be hauled by a HAL vessel without parting the HAL groundline. Given the tools available to the Council, the best way to mitigate the negative effects of gear conflict could be to select elements that minimize the likelihood of gear conflicts in the first place, or to encourage other forms of fleet cooperation. Those tools include the sharing of information on where gear is set (or lost) on fishing grounds (Element 2, Option 1), and the required marking of pot longline sets at both ends with flagpoles and other features that enhance gear visibility to humans and to radar or other tracking technology (Element 3).

Without knowledge of individual participants' business plans, the analysts have little basis to prescribe an optimal pot limit for each area. As guiding principles, the Council may consider three things: first, gear is expensive so fishermen have an incentive to fish no more than the optimal amount of gear for them (any amount beyond that amount brings diminishing marginal returns); second, the GOA sablefish fishery is no longer prosecuted in a derby style, so preempting additional grounds for the sake of zero-sum competition is of limited value, especially given the lack of evidence that any particular spot on the fishing grounds will produce significantly larger and higher quality fish over the course of an entire season; and third, setting different pot limits for each GOA management area complicates enforcement.

4.9.3.1 Effects of Requiring Pot Identification Tags (Option)

Section 4.6 of this document provides background information on the administration of gear identification tag programs in state-managed pot fisheries off of Alaska and the U.S. West Coast (California, Oregon,

and Washington). Those programs use gear tags to enforce pot limits, similar to what is being considered for this action. Most of the fisheries covered in the background section use single pot gear, meaning that each pot is connected to its own buoy, and that buoy tags can serve the same function as a tag affixed to an individual pot. Buoy tags would not be an effective way to enforce pot limits in a pot longline fishery because a variable number of pots (around 30 to 50) are affixed to a groundline between two end-buoys. Regulating the number of pots that could be on a given string would reduce skippers' flexibility in tuning their strings of gear to suit fishing and environmental conditions, and would be difficult to enforce. This and other enforcement considerations are discussed in the following subsection.

Requiring pot tags is primarily an enforcement measure. The costs associated with the pot tag option are direct costs for both the fishermen using pot gear and the responsible agency (presumably NMFS). Based on other Alaska programs, fishermen might pay around $1.50 or $2.00 per tag, which translates to a maximum annual cost of $90 to $800, depending on the actual acquisition price and the selected pot limit[50]. Some fisheries charge an additional tag replacement processing fee (around $10) for lost tags. Some fisheries issue gear tags for more than one year. Multi-year tags would reduce the annual cost of a pot tag program. Multi-year tags might be appropriate if fishermen and NMFS are confident that the physical tags will endure multiple seasons, and if the relevant pot limit is not expected to vary from year to year – which should be the case if pot limits are defined in regulation. Multi-year tags are not appropriate if the tag authorizes use in several fisheries that have different pot limits (e.g., crab fisheries in SE Alaska state-waters); this is not the case for the action under consideration here. The number of tags required, and the associated cost of acquisition, would increase if the Council selects different pot limits for different areas and requires a unique tag – perhaps of a different color – for each authorized area. A fisherman with sablefish IFQ in two management areas might need two sets of tags[51]. For 2013 and 2014, the number of active vessels in each area that also made landings in another GOA area is shown in Table 32 (Section 4.5.6)

NMFS would bear some additional cost in administering a pot tag program. Staff would likely be responsible for estimating the number of participating vessels for a given year or set of years, ordering tags, issuing/shipping tags and replacement tags to IFQ holders, recording the tag series numbers in a format that identifies the series with a particular IFQ permit holder *and* vessel number, and making that information available to enforcement officers. NMFS would not have to estimate the number of participating vessels if every IFQ permit holder is required to purchase their limit of tags regardless of whether or not he or she intends to fish pot longline gear. For a pot limit that is applied at the permit holder and vessel-level, NMFS may have to spend time establishing which permit holders plan to fish from a certain vessel, and ensuring that the total number of tags issued to the several permit holders fishing from that vessel does not exceed the vessel pot limit for the applicable area(s). The analysts surveyed the managers of other gear tag programs, and understand that the margin between the cost of sourcing tags and the price charged to fishermen only covers the cost of shipping, overstock (from overestimating fishery participation), and replacements. Staff time is not funded through tag fees. Leftover funds, if any, are typically placed in a separate account and used to defray costs in subsequent years.

Entities that cooperate in distributing batches of pot tags and replacement tags could accrue small time costs, if the final program is designed to require their help. For example, processors may play a role in distributing batches of tags to pot longline fishermen at the beginning of the fishing season, and transmit a

[50] That is, $90 = 60 pots at $1.50 each; $800 = 400 pots at $2.00 each.

[51] Shoreside enforcement of pot limits for fishermen making a landing from multiple sablefish areas would not necessarily be solved by pot tags; enforcement considerations for pot limits are discussed in the following subsection.

lost gear affidavit to NMFS during the season. Tender vessels could be asked to transmit a lost gear affidavit to NMFS and deliver a replacement tag to a vessel while at sea.

The benefits of pot tags are not as readily quantifiable, but relate to the improved function of the pot fishery as a whole. The analysts' assumption is that fishermen who choose to use pot longline gear derive a net benefit from having that option, specifically when weighed against the costs of whale depredation. If using pot longline gear is not beneficial, a fisherman can opt not to use it, thus avoiding the direct costs associated with pot tags. Under this option, a rational fisherman would only choose to use pot longline gear if his or her expected outcome exceeds that of fishing with HAL gear by an amount greater than or equal to the cost associated with applying for, installing, and maintaining pot tags.

All fishermen, regardless of the gear type they use, would benefit from pot tags insofar as the tags ensure that pot longline fishermen are adhering to their gear limit and not preempting more grounds than is allowed. A pot tag program could require fishermen who lose a tagged pot to submit an affidavit stating the pot's last known location. Including such a provision in the pot tag program would benefit all fishermen by reducing the likelihood of gear conflict with lost pots.

4.9.3.2 Management and Enforcement Considerations for Pot Limits

Alternative 2, Element 1 would limit the number of pots that a vessel fishing in a GOA sablefish pot longline fishery could deploy on the fishing grounds during each fishing trip (see Appendix 3 for the definition of fishing trip). This element limits the number of pots that can be fished during a trip to a specific number between 60 and 400 pots, and includes an option to require an identification tag on each pot. Pot limits, as defined in this action for the sablefish IFQ fishery, would control the level of fishing effort that a vessel could exert during the period of time between deploying and retrieving the gear. The principal purpose of a pot limit would be to minimize gear conflict that can occur when the fishing grounds are preempted by dispersal of one gear type to the exclusion of the same or another gear type. A pot limit may also discourage vessels from loading more pots than would be appropriate for the specific configuration of that vessel. Theoretically, this could reduce the risk of vessels capsizing or other conditions that might affect vessel safety (e.g., icing, or sudden shifting of pots). In practice, however, it is unlikely that a vessel pot limit would have a significant safety impact, because participants in the sablefish IFQ fishery are not engaged in a "race for fish" and do not have an incentive to maximize the number of pots that each vessel can deploy in as short a period as possible. Rather, vessels will have an incentive to carry the number of pots that is optimal for the operations of that vessel. Pot limits in the BSAI crab fisheries have been removed or substantially increased since the implementation of the BSAI Crab Rationalization Program (a catch share program) because the incentive to overload vessels has been effectively removed. In any case, pot limits do not substitute for USCG stability tests and load limits, the requirements for which are described in Section 4.8.3.

Two broad methods exist for monitoring pot limits: pre-departure gear inspections, and self-reporting. Monitoring the number of pots that a vessel transports for deployment would require a pre-departure gear inspection to verify that the total number of pots onboard is less than or equal to the pot limit. Vessels that choose to transport multiple loads of pots, such as a small vessel interested in deploying a large number of pots, would require multiple inspections to track the total number of pots transported for deployment during a fishing trip. OLE does not have sufficient enforcement personnel or resources to conduct dockside inspections in all GOA ports prior to each vessel's departure, and cannot commit to performing dockside inspections in any particular port. Additionally, the Observer Program does not have the expertise to conduct inspections on fishing gear. Therefore, determining the number of pots that a vessel transports for deployment or deploys in a longline configuration is limited to existing program resources.

An alternative method to determine the number of pots that a vessel has deployed on a fishing trip is to require all vessels fishing sablefish IFQ to self-report this information in a logbook. Currently, vessels greater than 60 feet are required to use NMFS logbooks. Therefore only a portion of the vessels in the GOA sablefish IFQ fishery fleet are required to submit logbook information (see Figure 26). However, many vessels less than 60 feet that fish sablefish are now participating in the program, voluntarily completing and submitting logbooks. There is a higher proportion of the catch documented by logbooks than by observers; 50% of the hook and line catch was documented in logbooks, compared to 12% for observer data. Some data is included in both data sets if logbooks are required and an observer was onboard.

Logbook participation increased sharply in 2004 in all areas primarily because the AFSC contracts with the IPHC to collect, edit, and enter logbooks electronically. This increasing trend is likely due to the strong working relationship the IPHC has with fishermen, their diligence in collecting logbooks dockside, and because many vessels <60 feet are now participating in the program voluntarily. In 2014, 68% of the logs collected that targeted sablefish were from vessels <60 ft. The preferred alternative would remove the exemption for the operator of a vessel <60 feet using longline pot. While this would be a new regulatory requirement for these vessels, many operators of these vessels voluntarily complete and submit logbooks. Therefore, the Council anticipates this additional reporting requirement would not negatively impact operators of vessels <60 feet that choose to use longline pot gear.

In 2012 and 2013, the number of sets recorded in logbooks and submitted by vessels less than 60 feet was approximately equal to the number from vessels greater than 60 feet (NPFMC 2014). A data field could be added to a vessel's NMFS logbook to allow the captain to record the total number of pots onboard a vessel before fishing commenced. This information could be randomly checked by NMFS OLE or the USCG, during dockside vessel inspections or at-sea boardings. Requiring a logbook and verifying a captain's logbook record of the total number of pots onboard a vessel would be necessary for enforcement and detection of regulatory violations.

In various crab fisheries in Alaska, ADF&G requires that a tag be affixed to the main buoy or the trailer buoy if more than one buoy is attached to a single pot. This requirement serves to aid at-sea enforcement in the verification of a pot limit. However, no tag is required on a shellfish longline (a stationary, buoyed, and anchored line with more than one pot attached) in those state fisheries.

Option 1 of Element 1 would require a pot tag system that is similar to the system the Atlantic Coastal Fisheries Cooperative uses to tag a lobster trap. OLE has indicated that a pot limit could be enforced most economically and efficiently using a pot tag system. If the number of pots deployed by a vessel is self-reported through logbooks, the use of pot tags provides an additional enforcement tool to ensure that the pot limits are not exceeded. The use of pot tags would require a uniquely identified tag to be securely affixed to each pot, and a logbook on every vessel to enter the tag numbers. This would allow at-sea enforcement and post-trip verification of the number of pots fished. Verification of pot tags could be accomplished periodically during dockside inspections by OLE personnel and during at-sea boardings by USCG personnel (only for gear that is not already deployed at the time of the boarding). The USCG does not require a vessel master to haul already deployed gear back on deck for inspection during the course of an at-sea law enforcement boarding. If a tag or tagged pot is lost or damaged, the permit holder claiming the lost gear would have to file an affidavit to receive a replacement pot tag.

Monitoring pot longline gear limits on the fishing grounds is problematic for OLE because they do not have a vessel capable of operating at sea in the conditions where many of these fisheries are likely to occur, even if pot tags are required. No Federal or State agency in Alaska, including the USCG or the Alaska Wildlife Troopers, has the ability to pull pot longline gear on the fishing grounds, therefore verifying a vessel's pot count and pot tags at-sea would have to be visually assessed when gear is

deployed or retrieved. Visually verifying a vessel's compliance with a pot limit on the fishing grounds would have to rely on at-sea inspections by enforcement agencies other than NMFS OLE, such as the Alaska Wildlife Troopers or the USCG; OLE would most commonly have a coordinating role.

Observers verify the amount of gear deployed on some but not all sets, to the best of their ability. These observations, in conjunction with the vessel logbook and/or captain's assistance, are used to estimate catch per unit of effort. Observer monitoring of a pot limit on the fishing grounds would only be possible during the first deployment of gear, assuming all pot longline sets are deployed and the observer has safe access to monitor the setting of the gear (i.e., unobstructed view of the deck and pot launching area). Even if these conditions are met, relying on the observer to complete this task may not be realistic on all observed trips. Once the cycle of gear deployment and retrieval begins, counting the number of unique pots being fished becomes complicated because some pot sets may be rotated more often than others.

NMFS developed management and enforcement considerations for a pot limit based on the assumption that permit holders with the harvesting privilege would be responsible for controlling effort. The remainder of this section (4.9.3.2) reflects this approach and not the Council's preferred alternative which assigns responsibility for all aspects of a pot limit to the vessel owner.

Industry and NMFS would have to implement a pot tag program in a timely basis. Sablefish IFQ permit holders would need to register with NMFS to request and to be issued pot tags. This registration would need to occur before the vessel begins fishing with pot longline gear, and would need to be done in enough time for NMFS to produce and issue the pot tags. NMFS anticipates that pot registration could occur both prior to and during the sablefish IFQ fishing season, but the IFQ holder would need to ensure that pot tags are received and attached to pots prior to deploying the pot longline gear. The IFQ permit holder could request a specific number of pot tags, but the maximum number of annual pot tags issued to a sablefish IFQ permit holder would be equal to the pot limit established for the regulatory area corresponding to the regulatory area on the IFQ permit. As part of the registration process, IFQ permit holders would be required to assign pot tags to a vessel licensed by the State of Alaska, with an ADF&G vessel registration number that is consistent with the vessel length category specified on the sablefish IFQ permit. Linking each sablefish IFQ holder with a specific vessel is essential to the effective implementation of a pot tag program. This will require each sablefish IFQ holder receiving pot tags to coordinate with the vessel using the pot tags to ensure that the vessel does not deploy more pots than the maximum amount permitted for that regulatory area. In cases where multiple sablefish IFQ permit holders fish from the same vessel, all IFQ holders and the vessel owner/operator would need to coordinate to ensure that no more pots are deployed from vessel than the maximum limit.

The transition to a pot tag program for longline pot gear will come with new administrative costs and challenges. NMFS has not implemented a pot tag program in the Alaska Region for other pot fisheries.[52] The most straightforward and least costly pot tag program structure would be for NMFS to issue pot tags to sablefish IFQ holders prior to the fishing season. The IFQ permit holder would be responsible for assigning pot tags to a vessel and coordinating with the vessel owner/operator to ensure that the number of pot tags assigned to a vessel does not exceed the pot limit specified in the fishing area. NMFS would not authorize transfers of pot tags during the fishing year. IFQ permit holders could request that NMFS provide a replacement for a lost pot tag. NMFS would need to establish application forms that would result in additional costs to implement the program. To save staff time and money, it is likely that NMFS would limit applications for pot tags/replacements to an online form. Given the broad use of internet by

[52] The BSAI Crab FMP establishes criteria for the State of Alaska to use in setting pot limits (BSAI Crab FMP Section 8.2.7). The State establishes the regulations for pot limits, and administers any pot tag program that is necessary to enforce them.

the IFQ fleet already for online applications and forms, this is unlikely to materially affect the application process.

A more flexible pot tag program would allow an IFQ permit holder to transfer pot tags to another permit holder and/or to another vessel during the fishing season to accommodate changes in fishing plans, (e.g., transfers of QS to new participants, changes in crew, changes in vessels to accommodate vessel breakdowns, etc.). This would require NMFS to establish a pot tag transfer process for IFQ permit holders, and would be more costly to implement and administer than a program that does not authorize transfers. Under this structure, the IFQ permit holder would continue to be responsible for assigning pot tags to a vessel and coordinating with the vessel owner/operator to ensure that the number of pots deployed by the vessel does not exceed the pot limit specified in the applicable regulatory area of the GOA. NMFS anticipates that this pot transfer component would be limited to an online application to limit administrative costs without diminishing access by IFQ holders.

NMFS has implemented a cost recovery program for the IFQ Program as required by the Magnuson-Stevens Act (§ 679.45). Under those regulations, NMFS recovers the actual costs directly related to the management, data collection, and enforcement of the IFQ Program. The Magnuson-Stevens Act mandates that cost recovery fees not exceed 3 percent of the annual ex-vessel value of fish harvested by a program subject to a cost recovery fee. Any pot tag acquisition fees would be additional to the existing cost recovery program.

The costs of implementing and administering a pot tag program would be included in the agency costs subject to cost recovery. Under IFQ Program cost recovery regulations, an IFQ permit holder incurs a cost recovery fee liability for every pound of IFQ halibut and IFQ sablefish that is landed on his or her IFQ permit(s). Therefore, all sablefish IFQ permit holders would be assessed a fee for the costs of implementing and administering the pot tag program for the sablefish IFQ fishery in the GOA. Implementation of a pot tag program would require revisions to the IFQ Program database. Although costs estimates are not available for implementation of a pot tag program, NMFS notes that recent revisions to the IFQ Program database for eLandings updates and implementation of the Guided Angler Fish Program in 2013 increased agency programmer and contractor costs by approximately $25,000 relative to 2012. NMFS anticipates it would incur the same level of costs, at a minimum, to implement a pot tag program that does not authorize in-season transfers. There are additional costs for creating and distributing pot tags. It is difficult to estimate these costs because there are costs that are fixed (i.e., costs simply to design and produce pot tags) and costs that are affected by the number of IFQ holders requesting pot tags (e.g., producing 1,000 pot tags vs. 10,000 pot tags). The number of pot tags required could vary substantially based on interest in the use of pot longline gear, or based on the options selected for the preferred alternative (e.g., allowing pots for only some GOA areas). Implementation of a pot tag program that allows in-season transfers would result in higher costs to revise the database as well as increased Restricted Access Management staff costs to provide user support. A more precise estimate of the total potential costs of implementing a pot tag program is not available at this time, given these factors.

Because NMFS Alaska Region has not previously implemented a pot tag program, it is likely that creating such a program could take additional time beyond the typical time required for rulemaking. The Council considered the timeliness of implementation and additional management costs when developing its preferred alternative, and determined that a pot tag system was necessary for the monitoring and enforcement of a pot longline fishery for IFQ sablefish.

The purpose of considering pot limits in Alternative 2, Element 1 is to control the level of fishing effort that a vessel could exert during the period of time between deploying and retrieving the gear. NMFS notes that IFQ Program vessel caps also control the level of fishing effort by limiting the amount of IFQ that a

vessel can harvest during the year. Current regulations at § 679.42(h)(2) specify that no vessel may harvest more than one percent of the combined fixed gear total allowable catch of sablefish for the GOA and BSAI IFQ regulatory areas. Additionally, in the SEO management area, no vessel may be used to harvest more than 1 percent of the fixed gear total allowable catch of sablefish for that area. The Council alternatives (considered and preferred) for this action do not propose revisions to the IFQ Program vessel use caps for sablefish.

4.9.4 Effects of a Gear Retrieval Requirement, Element 2

Element 2 – as considered in the action alternative before the Council at final action in April 2015 (see Section 4.3.1) – includes two options that could address gear conflict and grounds preemption, respectively. Option 1 would require the location of pots set, left, or lost on the grounds to be submitted to an electronic database. The Council did not define the nature of the electronic database and the entity or entities responsible for its operation and oversight. Option 2 would prohibit pot longline gear from being left on the fishing grounds for more than four or seven days (suboptions) without being moved or tended. In December 2014, the Council stated that hauling, re-baiting, and re-setting a pot longline string would meet the requirement of moving or tending gear under this option. Different time limits (i.e., four or seven days) could be selected for different areas or in different contexts. For example, a fishermen could be required to move or tend pot longline gear at least every four days during the season, but could have up to seven days to remove the gear from the grounds after the season closes or after the permit holder catches the entirety of his or her annual IFQ. It is assumed that any sablefish caught in pot longline gear that remains on the fishing grounds when the season is closed would have to be discarded upon retrieval.

The effects of each option are considered below. Following that, a discussion of how the objectives underlying these requirements might be achieved if NMFS is not directly involved in administering a gear tracking database is included. NMFS has stated that it would be difficult, if not prohibited, for the agency to actively disseminate information on the location of fishing gear. The alternate approach, a voluntary agreement between pot gear users, was suggested by stakeholders who are focused on developing a GOA sablefish pot longline fishery that has minimal impact on fishermen who continue to use HAL gear, and maintains maximum flexibility in the type of gear marking and tracking technology that is deployed.

Option 1

In terms of reducing gear conflict, Option 1 could benefit not only the GOA sablefish IFQ fleet, but all fishermen whose gear might interact with pot longlines. The extent of this benefit, however, depends on how and with whom the information in the "database" is shared; the Council's suite of alternatives set forth in its December 2014 motion does not speak to data access. At a minimum, the information should be accessible to both pot longline and non-pot sablefish fishermen, since it would be the HAL users who are assumed to incur the greatest cost from a gear entanglement.

The cost of operating a gear location database also depends on how it is designed. The database could be fairly low-cost if it is based on self-reporting to a data manager over VHF radio. The individual time-cost of reporting gear location would be small, but someone would have to pay for the labor to staff the database and disseminate the information to whoever is authorized to call in and ask for it. It is not clear whether that staff time would be an industry or an agency cost. Staff costs might be higher or lower if the information in the gear database is mapped and made available to authorized users through an internet interface. Developing a web tool could save time if the alternative is a human who would be receiving many individual requests for gear locations. However, if only a handful of people are requesting gear location data, it would probably be cheaper to disseminate the information through person-to-person contact. Accuracy might also be a concern for a manually reported database – though self-reported information is currently considered accurate when recorded in the skipper's logbook. Each fisherman

might individually choose to misreport his exact fishing site, preferring to keep their knowledge proprietary at the cost of the database's usefulness. Misreporting might be less of a concern in GOA areas where the productive grounds are spatially limited, and people already fish close together. The incentive to misreport gear location would be reduced if the database, in whatever form, anonymizes the gear location information.

The requirement under the Council's December 2014 version of Element 3 – to mark buoys with AIS transponders (or similar) – implies that some stakeholders are envisioning an automated database built around technology that is not yet fully developed. Appendix 2 provides background on AIS technology, noting that buoy transponders designed as fishing gear markers are not currently on the market, and are not an approved use of AIS under International Telecommunication Union (ITU) regulations and USCG policy. The transponder technology exists, but battery power and seaworthiness are problems that still need to be solved. Assuming that AIS technology can be adapted, the costs for pot longline fishermen would be moderate, but higher than reporting over the radio. According to product prices listed by internet retailers, and anecdotally affirmed by fishermen who have spoken to gear manufacturers, AIS units with additional power features and water-tight housings would be priced within the ranges reported below. Transmit-only AIS units tend to be priced in the $200 to $400 range. Marking on both ends would require two units per string; this analysis has previously assumed that a pot fisherman would deploy as many as six strings. Many vessels already carry AIS receivers to monitor vessel traffic, but those that do not would have to spend an additional $200 to $1,400 for a vessel unit, depending on the desired capabilities. Fishermen who do not switch to pot longline gear would also need an AIS receiver in order to see AIS data, unless the program includes the additional shared cost of a staff person who can act as a gear location clearinghouse for fishermen who radio in.

Several regulatory hurdles would remain, even after a hardy and long-lasting AIS buoy transponder is developed. The USCG and potentially the ITU would have to accept and approve the device type. Those bodies would need to feel assured that the AIS application would not threaten the functional integrity of the global AIS system once the additional signals join the communication band. The USCG would also need to determine how many MMSIs (unique AIS unit identifiers) would be required to put two on every pot longline string, and whether enough could be dedicated to that purpose.

Option 2

Leaving fishing gear on the grounds for extended periods of time preempts that area, making it unavailable to other users. In the limit, it is possible that pot longline gear set on the grounds at the season's opening could remain in essentially the same spot throughout the year[53]. The same, it appears, cannot be said for HAL gear. Through public testimony and fishermen's anecdotal accounts, the analysts understand that HAL gear cannot be left unattended for as long a period as pot longline gear. Fish caught on HAL gear will suffer from deadloss and sand fleas if left for too long. Lighter HAL gear is more susceptible to loss during harsh weather events that part the groundline from the buoy line; the prevalence of non-floating (non-neutrally buoyant) groundline makes lost HAL gear more difficult to grapple. For these reasons, HAL fishermen tend to soak their gear for less than 24 hours before hauling, and are less apt to leave their gear on the grounds when returning to port. By contrast, Figure 8 indicates that sablefish pot gear is typically "soaked" for two to four days, but is sometimes left for a week, and only very

[53] Regulations at §679.42 (Limitations on use of QS and IFQ) only require the IFQ permit holder or hired master to "be aboard the vessel at all times during the *fishing trip* and be present during the *landing*" [emphasis added]. This would imply that, theoretically, someone could run a person's pot longline gear out to desirable fishing grounds and set the gear – thus preempting the grounds – without even being a permit holder. A "fishing trip" is defined as the period beginning when a vessel operator commences harvesting IFQ species and ending when the vessel operator lands any species. Harvest is defined as the catching and retaining of fish, and landing means the offloading of fish. It should be noted that the same definitions apply to IFQ harvest with HAL gear, but as noted in this section, HAL users have little incentive to hold or preempt grounds for an extended period of time.

occasionally longer than one week. Soaking pot gear can allow less desirable small fish to swim out of strategically sized escape rings, so longer rotations can actually prove beneficial.

Other regions are also considering grounds preemption in the context of pot gear. In June and November of 2014, the Pacific Fishery Management Council (PFMC) received public comment letters from sablefish limited access HAL fishermen in the Point Conception, California area stating that trawl IFQ vessels were exercising their ability to fish sablefish quota with pot gear, entering traditional HAL fishing grounds, setting pots, and going out of radio range to make deliveries[54]. The commenters' concerns addressed localized depletion of sablefish, personal safety risks, and gear loss posed by unattended pots. In recommending a preferred alternative (see Sections 4.3.2 and 4.10), NPFMC has determined which of the options available under Element 3 sufficiently mitigate safety hazards (specifications for gear marking is further discussed under Element 3, in Section 4.9.5). The requirement to move pot longline gear within a certain time frame could mitigate the grounds preemption problem in the GOA *if* the gear is truly relocated. However, if a fisherman using pot longline gear intends to re-set his string, then the HAL fisherman's opportunity to use those grounds would occur during the precise moment when the pot gear is hauled. Such intense competition for fishing grounds is likely an extreme case, especially in light of the fact that the GOA sablefish are no longer fished in a derby style. If these conditions do exist in the GOA, they would most likely be found in an area where the productive grounds are constrained to a narrow shelf edge that is fished by a fleet with limited range. The analysts do not have access to fishery data on such a fine spatial scale as to identify particular areas where competition for fishing grounds is expected to be intense.

Overall, the Council's position that simply "tending" a pot longline string every so many days would satisfy the requirement weakens Option 2 as a tool to mitigate excessive grounds preemption. In light of that, choosing a very short maximum soak time would likely have costs that outweigh the benefits. Requiring a vessel to return to and retrieve its gear by a certain day could, in some circumstances, force vessels to operate in unsafe or unfavorable conditions. Aside from weather, a short soak limit could reduce a skipper's ability to fish an optimal gear rotation if the vessel's strings are spaced out over a large geographical area, or if the skipper determines that a particularly long soak time yields larger fish in that area. However, Option 2 could be framed as an effective measure for ensuring that pot longline gear is removed from the fishing grounds within a certain amount of time after the vessel has harvested all of its IFQ. A vessel has no incentive to tend – as opposed to relocate – its pot longline gear if it cannot be re-baited, and removing the gear would open up grounds for other fishermen who are still active in the fishery.

Pot Gear Group Agreement

GOA sablefish participants who advocated before the Council for the ability to use pot longline gear as a means to address whale depredation are cognizant of how their gear choice might impact other stakeholders. Pot longline advocates testified on approaches meant to assure the Council of their ability and willingness to provide information on the location of pot longline gear on the fishing grounds, in as close to real-time as is practicable, and without placing additional cost burdens on the HAL fleet. These proponents presented a voluntary measure in the form of a written "agreement", which would set out expectations of, and best practices by, those who opt to use pot longline gear.

While the Council did not recommend the formalization of a gear group agreement as part of its preferred alternative (Section 4.10), aspects of the proposal described below played a role in guiding language that

[54] PFMC June 2014 Briefing Book, Agenda Item F.3.c, Public comment (available at: http://www.pcouncil.org/wp-content/uploads/F3c_PubCom_JUNE2014BB.pdf), and PFMC November 2014 Briefing Book, Agenda Item B.1.c, Supplemental Public Comment (available at: http://www.pcouncil.org/resources/archives/briefing-books/november-2014-briefing-book).

was included in the Council's motion at final action in April 2015. Fishermen's willingness to work beyond gear specifications and gear retrieval requirements that could have been set in regulation, combined with the Council's commitment to review the fleet's co-management progress after implementation, gave both stakeholder and decision-makers comfort that legal gear and marking technology did not need to be defined with highly specific regulatory language.

The motivation to develop a framework agreement, to which pot longline vessels could sign on annually, is two-fold: (1) formalizing a commitment to mitigating gear conflict impacts on HAL fishermen, and (2) maintaining flexibility in finding and deploying the best available technology to accomplish effective gear tracking, as that technology evolves and improves over time. The key concern with regulating gear tracking technology is that a device defined in regulation could become both expensive and outdated by the time that a final rule is implemented, or soon after. The Council and NMFS could face time-consuming tasks in updating gear specifications as new best practices emerge. Regulating technology could also have the unintended effect of reducing a pot longline fleet's incentive to invest in more effective tools as they emerge. Moreover, disseminating gear location data could require sharing information that is confidential when handled by a government agency. Finally, voluntary agreements between stakeholders utilize social relationships within the fishery to ensure that best practices are actually adopted and used to their full benefit.

When considering a cooperative approach, the Council is typically concerned with two issues: ensuring the voluntary nature of cooperative membership, and retaining its own authority over management of the fishery. Whether or not the use of a gear group agreement requires regulatory language depends on the whether the agreement is considered "voluntary". As it was presented to the Council, GOA sablefish fisherman would not be required to sign onto an agreement because each individual would have the option to continue using HAL gear. If use of pot longline gear is made contingent upon signing an agreement, this approach would have elements similar to many cooperative management programs. From a confidentiality perspective, it may be difficult for NMFS to require a fisherman to join a cooperative whose terms include the disclosure of gear location information. To this point, the proponents who suggested that a gear group agreement could retain a third-party to whom the signatories would give authority – outside of the agency – to monitor compliance with the terms of the agreement. That approach does not, however, address the risk that a vessel operator might choose to deploy pot longline gear without signing on to the agreement. In regards to management responsibility, signatories to a gear group agreement would not need, or necessarily seek, any authority over when, where, or how many sablefish are harvested. The Council has enabled cooperatives in other Alaska fisheries to develop and implement incentives to address management objectives, and has retained oversight by requiring those cooperatives to make annual public reports at Council meetings.

The terms of the voluntary agreement proposed before the Council would have covered specifications and procedures for marking and tracking pot longline gear, as well as annual reporting to the Council and NMFS. Gear marking requirements could include the labeling of buoys with a vessel's FFP or ADF&G registration number, and/or some signal that the buoy is attached to pot longline gear that is targeting sablefish IFQ. This type of requirement could also be set in regulation. The agreement could also require that a satellite tracking device or radar reflector is attached to the buoy when the pot longline gear is fishing or otherwise left on the grounds. The agreement could require that a sablefish pot longline vessel utilize gear transponder devices such as AIS or the other technologies discussed in Section 4.9.5, below. The agreement could also require reporting of latitude and longitude the ends of a pot longline string either to a map-based service – e.g. Marine Exchange of Alaska's (MXAK) provision of AIS data – or to an email list that is available to other IFQ harvesters. Processors, many of whom already subscribe to MXAK's AIS service, could provide latitude/longitude information to non-pot harvesters who deliver to their plant(s). Finally, the agreement could require the reporting of the last known time and location of

lost pot longline gear and pots, or incidences of gear conflict; that information could also be reported to the aforementioned map-based service or email list.

The presented agreement would have required permit holders using pot longline gear to present a collective annual report to the Council, covering such items as: the number and circumstances of interactions between pot longline gear and non-pot gear, the approximate location of lost gear, and estimates of bycatch by pot longline vessels. The parties providing the report would be functioning in a manner similar to a voluntary cooperative. The communication required to develop the report would constitute an opportunity to exchange information on new technology applications that further the Council's objective of limiting gear conflict, and innovations that improve the battery life and durability challenges associated with fielding a capable and cost-effective transponder device. Members of the gear group would continually refine the best approach for sharing pot longline gear location information in a manner that is accessible to all participants and not overly burdensome on any entity in particular. At the Council's suggestion, a gear group might also be able to aid in-season managers by notifying NMFS when an IFQ harvester or longline pot vessel plans to stop fishing for the year. That information could be of service in applying any end-of-season pot longline gear removal requirements under Option 2, thus, reducing the time that fishing grounds are preempted as much as possible.

4.9.4.1 Management and Enforcement Considerations for Gear Retrieval

Alternative 2, Element 2 would impact the retrieval of gear in a GOA sablefish IFQ pot longline fishery. Two options are proposed for this element. The first option would address information that must be shared about the status of pot longline gear deployed on the fishing grounds; the second option relates to the period of time over which pot longline gear can be left unattended.

Element 2, Option 1 would require the location of pot longline gear deployed, location of pot longline gear soaking in the water, and location of pot longline gear lost on the fishing grounds be submitted to an electronic database. NMFS acknowledges that information on where gear is left or lost is important to the fishing fleet and could help prevent one fisherman's gear from becoming entangled in that of another. Currently, the location of a pot longline set is recorded in required NMFS logbooks on catcher vessels greater than 60 feet LOA and CPs fishing sablefish with pot longline gear in the BSAI. Vessel operators have the option to add information on the location of lost pot gear and begin and end buoy number. However, data from these paper logbooks have not been electronically entered. These logbooks do not require the location of individual pots set in a longline configuration. In addition, NMFS does not require logbooks on catcher vessels less than 60 feet LOA.

NMFS notes that electronic logbooks are available through eLandings, but like paper logbooks individual pot locations are not recorded and logbooks are not required on catcher vessels less than 60 feet LOA. Even if this information is reported to NMFS in an electronic form, it would be considered confidential and not available to other participants. OLE could confirm receipt of this information, but would not be able to verify that pot longline gear was left on the fishing grounds or the location of that gear. In addition, OLE cannot enforce a requirement to report the loss of gear because there is no way to verify that fishing gear is lost. Therefore, NMFS did not develop draft regulations to implement Element 2, Option 1 for the Council's review at final action.

An alternative approach would be to develop new recordkeeping and reporting and a new pot longline gear tracking database which would require extensive investment. Implementing a pot longline gear tracking system using technology such as AIS or a scannable pot tag to locate pot longline gear on the fishing grounds is beyond the scope of available NMFS resources in the Alaska Region. In addition, anecdotal reports suggest that AIS or other scannable systems may not be effective in all weather and sea conditions (e.g., signals can be blocked or greatly attenuated in high seas). Given that these factors and

the total costs of fitting pot longline gear could be substantial, these gear tracking systems may not be appropriate at this time. Generally, NMFS has not recommended specifying technologies given the rapid rate of technological change in maritime electronics. NMFS did not consider the specific type of "performance standards" that might be required to scan and track pot longline gear given the agency's limited expertise with this technology.

Element 2, Option 2 would require each vessel to retrieve all of their pot longline gear every four or seven days. To determine compliance with gear movement on the fishing grounds, OLE personnel would conduct dockside inspections of a vessel's logbook record for the dates pot longline gear is deployed and retrieved. OLE conducts dockside inspections of the catch and mandatory logbooks at the time of landing. OLE currently completes dockside inspections of the hook-and-line sablefish IFQ fishery, and anticipates this practice could be continued using current resources for pot longline gear vessels in a GOA sablefish IFQ fishery. However, as described in Section 4.9.3.2, logbooks are not required on all vessels fishing sablefish IFQ. Currently, the operator of a catcher vessel greater than 60 feet LOA using fixed gear, setline gear, or pot gear in the GOA is required to maintain a daily fishing logbook (DFL). The operator of a CP in the GOA must use a combination of daily CP longline and pot gear logbook (DCPL) and eLandings. Both DFL and DCPL require catch by set information, which includes pot gear set begin and end positions in latitude and longitude to the nearest minute when the pot gear entered the water and where the last pot of a set is retrieved. To determine that all vessels in a pot longline fishery move their gear, logbooks would be required to be maintained by vessels participating in the fishery that are less than or equal to 60 feet LOA. Regulations to require vessels less than or equal to 60 feet LOA to maintain a DFL are provided in the list of regulations in section above (4.9.3.2) under §679.5 Recordkeeping and reporting (R&R). In addition, a regulation to require pot longline gear be moved every four or seven days would be added to §679.42 as shown below.

At final action, the Council considered additional gear retrieval regulations. First, while Element 2, Option 2 allows gear to remain in place for four to seven days, it does not require pot longline gear to be removed from the fishing grounds at the end of the sablefish fishing season. In addition, if a vessel cannot comply with pot longline gear removal at these times due to incapacity, vessel/mechanical inoperability, and/or poor weather, then the regulations would need to require that fish caught in the pots upon gear retrieval be discarded. These draft gear retrieval regulations could be added to §679.7 as shown below. Second, the Council considered whether to recommend regulations that prohibit retention of fish and use of specific gear prior to the opening of a fishing season in order to provide a "fair start" for participants in the fishery. For example, section 19 of the IPHC annual management measures specifies that no vessel using setline gear (IPHC equivalent to HAL) may be used to catch or possess halibut if that vessel was used to fish for any species in halibut regulatory areas during the 72-hour period immediately before the opening of the halibut fishing season unless that vessel has removed all of its setline gear from the water and either (1) makes a landing and completely offloads its entire catch of other fish, or (2) submits to a hold inspection by an authorized officer, before the vessel may be used to catch or possess halibut. Such a regulation may alleviate concerns about grounds preemption and gear conflicts between hook-and-line and pot longline gear at the beginning of the IFQ fishing season because it would reduce incentives for sablefish IFQ permit holders in the GOA to deploy pot longline gear prior to the season opening.

4.9.5 Effects of Gear Specifications, Element 3

Element 3 in the alternatives that the Council considered at final action in April 2015 would require both ends of a pot longline set in the GOA sablefish IFQ fishery to be marked with buoys, flagpoles, and a transponder that is compatible with a location and identification system such as AIS. The language in the Council's December 2014 motion referred to pot longline sets specifically, though there is no regulatory distinction between a pot longline used for sablefish or in another fishery. The regulatory amendments

that would stem from this action could be written to note that certain requirements would not apply to all GOA pot fisheries. Potential regulatory language is discussed further in the following subsection.

Some state-managed pot fisheries along the U.S. west coast have specific requirements for pot gear in certain fisheries. For example, the State of Oregon requires pot longline gear strings in the coonstripe shrimp fishery to be marked at each end with a flagpole, a light, a radar reflector, and a buoy showing the vessel owner/operator's identification number. California has similar requirements for its state-waters sablefish fishery, and requires that the buoy be marked with a license number and the letter "B"; the letter marking distinguishes the buoy from gear for other finfish and lobster.

The Council's considered alternatives do not attempt to regulate the type of pot that could be used to target sablefish. Choosing not to regulate pot specifications benefits fishermen by allowing them to choose a model that they feel performs best in their area and fits their platform's deck, hydraulic capabilities, and safety requirements. Rectangular, conical, and trapezoidal pots are all used throughout the U.S. west coast, Canada, and Alaska; common sizes range between 36 inches and 72 inches in diameter, and 28 inches to 32 inches in height. Even in the absence of pot size specifications, it is not likely that fishermen could repurpose any Pacific cod or crab pots that they already own. The pots used in those fisheries tend to be significantly larger, heavier, and made of galvanized steel. NOAA's Fixed Gear Guide for the U.S. west coast states that a common size for Pacific cod and crab pots is an 89 inch by 89 inch by 36 inch rectangle.[55]

Use of buoys and flagpoles is said to be part of current industry practice in Alaska's pot fisheries, though some longline set-ups are only buoyed and flagged on one end. The cost of increasing the required amount of equipment would fall on harvesters, and would be directly related to the number of strings they deploy. Requiring more gear would also increase the demands on deck space, which could further raise the barrier to entry for smaller vessels that might wish to consider using pot longline gear. Marking both ends of each pot longline string has two main benefits. First, other fishermen can more easily discern the location of the pots on the ocean floor – roughly on a line between the buoys – so gear conflict would be marginally easier to avoid. Second, if gear conflict does occur and a groundline is parted, the pot longline string could be hauled up from the buoy on either end as opposed to having to grapple for part of the lost string as it sits on the bottom.

The specification to mark gear-ends (buoys) with "transponders" is a broad enough directive as to leave the fishery participants and their suppliers some room to develop a workable technology. The analyzed alternatives noted that transponders should work with AIS or an equivalent system. AIS technology, application, approximate cost, and some relevant regulations are described in Appendix 2. The key challenges involved in making AIS a viable approach for buoy transponders – battery life, seaworthiness, and regulatory approval by the Coast Guard and international oversight bodies – are also described in Section 4.9.4 under the discussion of an "electronic database" for tracking pot longline gear location. If an information distribution network can be developed, the primary benefit of gear transponders is that any fishery participant can view the location of set gear in real-time, or near enough as to be effective for conflict avoidance. AIS transponder data are generally compatible with radar plotters that are typically present on GOA harvest vessels. AIS transponders should appear on the plotter of radar-equipped vessels that are within line-of-sight with the signal; registered members of a group like MXAK would be able to receive AIS location data when an internet connection is available. If internet access and subscription

[55] NOAA's "Fixed Gear Guide: California, Oregon, and Washington Commercial Fisheries – Trap/pot, gillnet, and longline/set line." Available at: http://www.westcoast.fisheries.noaa.gov/publications/protected_species/marine_mammals/large_whale_entanglement_appendix_a-e.pdf

service are a limitation, fishery participants may be able to get gear location information before leaving port from a data manager, or from an email-based service as described in Section 4.9.4.

Stakeholders have testified on their experimentation with other devices that could be used for a purpose similar to what AIS might achieve. The Council received testimony about the potential use of global positioning system (GPS) devices such as a *SPOT Trace*[56]. This type of GPS device can be programed to send text messages or emails with the unit's GPS coordinates when movement is detected, or can be customized to transmit at certain time intervals. Given the concern with battery life on a buoy configuration, motion-triggered activity is not likely to be a solution for pot longline gear monitoring over gear rotations that can last up to a week. The *SPOT* unit retails for around $100, and requires an annual service plan that is also priced around $100 per year. A company that provides observers and electronic monitoring services is field testing radio-frequency identification (RFID) tags and scanners in the GOA Pacific cod pot fishery. RFID tags use electromagnetic fields to transfer data and can be used to automatically identify objects to which they are attached. RFIDs are commonly used to track livestock, pets, and identify automobiles in highway toll automatic payment systems. With the use of an onboard scanner, RFID tags have successfully recorded when pots were set and brought back onboard. The company is testing software that would link that to location data. It is currently feasible to store that data on a removable hard drive for retrieval on shore, but since the data are in the form of a small text file it is reasonable to think that it could also be transmitted to a database from remote locations. RFID tags can cost as little as 50 cents and as much as $50, depending on the type, the application, and the volume of the order. Simple identification tags would likely be priced on the low end of that range. The scanner itself, however, can cost in the several thousands of dollars. Finally, stakeholders have informed staff that they are working with a satellite telephone provider to develop a mobile application that could track "tagged" buoys in a manner similar to the way that shipping containers are tracked. A vessel operator could receive text messages providing the location of tagged buoys. This application would require a vessel to have a satellite communication system on board, which may not be the case for all sablefish fishermen who might be affected by the presence of pot longline gear on the fishing grounds. A vessel would also need to have an internet connection in order to receive messages containing gear location.

Technologies that require the purchase of expensive gear by non-pot users would have a negative overall impact on GOA sablefish fishery participants who continue to use HAL gear, either by choice or due to the limitations of their vessels. One such gear tracking technology, a VHF radio transponder affixed to a pot longline buoy, would only be visible to vessel operators who purchase a costly VHF transponder receiver. Another option highlighted by industry, a "radar exciter", would impose similar additional costs on stakeholders who would not receive direct benefits from a of pot longline gear fishery. Participants noted that the radar exciter technology might be so expensive as to preclude its cost-effective use even by participants who might benefit from using pot longline gear.

Fishermen noted the use of "buoy clusters" and/or "trailing buoys" in other fisheries as a method to keep surface gear from being submerged during strong tides. Buoy clusters add buoyancy to surface gear by putting additional buoys on the main anchor line. Using additional buoys would have a direct monetary cost and would also require more deck space. The benefit of additional buoyancy is the reduced likelihood that important and expensive electronic equipment would be lost while unattended at sea. A trailing buoy is an additional buoy attached to the main anchor buoy by a separate line. If the anchor buoy is submerged, the trailing buoy could remain at the surface unless forces add tension to and submerge this additional length of line. For the purpose of this action, gear marking electronics could be attached to a trailing buoy.

[56] www.findmespot.com

Gear is a major cost for fishermen, so elements that prevent conflicts or otherwise reduce the likelihood of gear loss are benefits that merit moderate additional expenditures. That said, these extra costs accrue only to the harvester and erode his or her profitability margin. Additional costs may fall more heavily on operators with smaller gross revenues. Additional costs that are explicitly associated with pot longline fishing could provide a larger benefit to operators who also prosecute other pot fisheries, but would provide lesser returns to fishermen whose other activities include salmon trolling or non-pot fisheries. In general, gear specifications that pertain only to the GOA sablefish IFQ fishery, but are not applicable in other fisheries, are a clear cost burden to the harvesters who are directly regulated by this action. The Council would minimize the additional cost to harvesters who participate in other pot fisheries by approving regulatory language that does not preclude the use of pot gear in other pot fisheries.

4.9.5.1 Management and Enforcement Considerations for Gear Specification

Alternative 2, Element 3 – as analyzed – would require both ends of a pot longline set in the GOA sablefish IFQ fishery to be marked with buoys and/or flagpoles and transponders that work with AIS or an equivalent system (flagpole assembly). Element 3 is specific to a sablefish IFQ fishery in the GOA that uses pot longline gear and would not be applied to all groundfish pot gear in all areas. Existing NMFS and ADF&G groundfish regulations have similar descriptions of pot gear buoy marking requirements, but do not require a flagpole assembly. NMFS revised the identification marking requirements for fishing gear marker buoys used in Federal waters off Alaska on April 3, 2014 (79 FR 18655), to align with ADF&G requirements.

NMFS recommends, and the Council's Enforcement Committee noted, that pot longline gear should have a specific buoy marking requirement that is distinct from HAL gear, so that enforcement agency personnel on vessels or aircraft could readily identify the different gear types. Current regulations require any vessel fishing under the IFQ Program to mark all buoys carried on board or used be marked with the vessel's FFP number or ADF&G vessel registration number. Adding the initials "LP" for "Longline Pot" before the FFP number or ADF&G number would distinguish buoys for this gear from HAL buoys and single pot buoys. NMFS proposes a draft regulation be added (§679.24(a)(3)) as shown below.

In addition to buoys, the Council considered a requirement that both ends of a set of pot longline gear be marked with a flagpole and transponder that is detectable by an AIS receiver or an equivalent system. As explained in Appendix 2, existing AIS or equivalent technology is currently available and used throughout the North Pacific, though the scale of the application necessary to mark a flagpole is in development. Given the state of technology, the necessary infrastructure to implement monitoring of the locations pot longline sets and enforcement for compliance, NMFS is not able to support a requirement for a flagpole assembly with available resources. Therefore, NMFS did not develop draft regulations to implement the Element 3 requirement that both ends of the sablefish pot longline set be marked with "flagpoles and transponders that work with AIS or an equivalent system."

Element 3 would require that both ends of a pot longline set be marked with buoys and/or flagpoles. This requirement could not be enforced prior to fishing, or dockside, because the number of sets of pot longline gear and, thus, the number of buoys and/or flagpole assemblies is unknown until the gear is deployed on the fishing grounds. Monitoring and enforcement of marking both ends of a pot longline set could be minimally accomplished by requiring a mandatory logbook on all vessels using pot longline gear in the sablefish IFQ fishery in the GOA. Monitoring and enforcement could be best achieved on the fishing grounds through direct observation of the pot longline gear being deployed. OLE does not have the personnel or resources on the fishing grounds to observe or verify buoys and/or a flagpole assembly on both ends of a pot longline set. The USCG does have the ability to observe the marking of a pot longline set, as well as logbook entries when available, during an at-sea boarding. However, the USCG may only be able to observe a limited number of pot longline sets while onboard a vessel if sets of gear

are already deployed. Furthermore, USCG is only able to board a limited percentage of the IFQ sablefish fleet each season. Observers would not be able to monitor a vessel's buoy and/or flagpole assembly because once fishing begins they are occupied with sampling and data collection duties. Additionally, as noted above, observers are not deployed on all vessels. Therefore, monitoring and enforcement of buoys and/or a flagpole assembly at both ends of a pot longline set is limited by current resources.

Although NMFS is not able to support a regulatory requirement for a sablefish pot longline set to be marked with flagpoles and transponders that work with AIS or an equivalent system, the Agency encourages the use of gear construction that enhances the safety as well as the reliable retrieval of gear. Gear enhancements that are beneficial to the IFQ fishing fleet should incorporate best practices and technology.

4.9.6 Effects of Allowing Retention of Incidentally Caught Halibut, Element 4

Element 4 would allow the retention of halibut that are caught incidentally in longline pot gear in the GOA sablefish IFQ fishery, subject to existing size retention requirements and provided that the sablefish IFQ holder also holds sufficient halibut IFQ. Allowing the retention of halibut caught in pot longline gear will require complementary action by the IPHC to define the gear as a legal gear type for halibut. The IPHC has not formally indicated whether it would authorize the retention of halibut caught with pot longline gear, so no decision can be presumed. The Council's records do indicate, however, that IPHC staff was not inclined to foreshadow the authorization of pots as legal gear during the Commission's February 2014 report to the Council. The Commission may be concerned about changing the traditional nature of the directed halibut fishery, which has historically been prosecuted with HAL gear.

This action – both as considered at final action, and as recommended in the preferred alternative – does not provide any measure to define or enforce the "incidental" nature of halibut catch in sablefish pots, such as an MRA. In December 2014, the Council discussed whether or not an MRA could be defined for pot longline gear in a GOA sablefish IFQ pot fishery, but noted that the lack of a pot longline gear fishing track record in the GOA creates a gap in requisite information. The catch rate of halibut in pot longline gear in the GOA, and pot-specific gear selectivity curves for the halibut in the GOA are unknown. Incidence of halibut in pots tends to be low in areas where pot gear is allowed, such as Canada[57] and the area where halibut regulatory Area 4A overlaps with the BS and AI sablefish management areas (see Table 5 in Section 3.2.1.2). This is likely due to the different depths at which sablefish and halibut typically occur. On average during the 2009 through 2013 period, fewer than 3,000 halibut were caught in pots that produced over 1 million round pounds of sablefish per year[58]. Halibut are most likely to be found in sablefish pots in late spring (April through June).

The Council has considered a separate action that would allow retention of halibut in pot gear in the BS and AI sablefish management areas that overlap halibut regulatory Area 4A. That action also would have required complementary IPHC rulemaking, and includes the establishment of an MRA as an option in the preliminary set of alternatives. Area 4A includes a portion of the WGOA sablefish management area. Staff assumes that setting an MRA through the Area 4A action would not affect regulations in the WGOA; in other words, there would not be an MRA set for only the Area 4A portion of the GOA that

[57] Information provided by the Canadian Sablefish Association, cited in the December 2013 expanded discussion paper on this action, available under Agenda Item D-2 at http://legistar2.granicus.com/npfmc/meetings/2013/12/875_A_North_Pacific_Council_13-12-09_Meeting_Agenda.pdf.

[58] A weight-to-weight comparison is not possible because halibut catch is reported in net weight. Converting the reported net weight of halibut catch to round weight would be based on a reported average, and would not necessarily be more informative to the conclusion that halibut are a small portion of the weight of sablefish caught in pots.

overlaps the WGOA. At present, the Council has decided to take no further action on halibut retention in pot gear in Area 4A for the time being.

Selecting Element 4 would create efficiencies in the harvest of the IFQ fisheries, and is not expected to drive QS consolidation since it would contribute to the overall profitability of sablefish IFQ trips, regardless of vessel size.

Many of the participants in the sablefish IFQ fishery are also halibut IFQ stakeholders; this is especially true among the operators of smaller sablefish vessels (see Table 28 in Section 4.5.5). Omitting Element 4 from the preferred alternative would increase the amount of halibut discarded and the associated mortality could increase. Increased discards would adversely impact the future harvestable halibut biomass.

Halibut caught on sablefish HAL gear in the GOA may be retained under current regulation, provided that the sablefish IFQ permit holder has the necessary halibut IFQ. The halibut are discarded if the permit holder does not have the necessary halibut IFQ. Mortality rates for halibut discarded from HAL gear are low relative to discards from other gear types.

According to the Sablefish Gear Committee, halibut mortality in pots might be higher than that of HAL-caught halibut, due to the longer soak time for pots. With or without Element 4, however, this analysis concludes that replacing some amount of HAL effort with pot longline gear effort could benefit the stakeholders in the halibut IFQ fishery. Increased use of pots would reduce the number of halibut that are depredated by whales off of HAL gear, thereby reducing a source of unaccounted halibut mortality.

4.9.6.1 Management and Enforcement Considerations for Retention of Incidentally Caught Halibut

Alternative 2, Element 4 would allow retention of halibut caught incidentally with pot longline gear in the GOA sablefish IFQ fishery, provided the sablefish IFQ holders onboard the vessel hold sufficient halibut IFQ. Under Element 4, halibut retention on a vessel would be limited by the amount of unfished, annual, halibut IFQ currently held by the IFQ permit holders onboard the vessel for the IFQ fishing season, size of vessel fishing, and halibut regulatory area being fished. Element 4 addresses management of Pacific halibut, which is shared among the Council, IPHC, and NMFS.

Allowing retention of halibut IFQ in addition to sablefish IFQ in pot longline gear in the IFQ fishery for sablefish in the GOA would require a separate and complementary action by the IPHC to redefine allowable gear for the retention of halibut in the GOA. IPHC defines fishing gear for the IFQ halibut fishery in Section 19 Fishing Gear, of the Pacific Halibut Fishery Regulations (halibut annual management measures). Since Element 4 was included in the preferred alternative for this action, the Council will recommend that IPHC revise regulations to allow persons to fish and possess IFQ halibut taken with pot longline gear.

Federal definitions of "IFQ halibut" are codified at §679.2 and §300.61 respectively, and would need to be changed to identify pot longline gear as legal gear to harvest IFQ halibut. Currently, NMFS and IPHC define "IFQ halibut" as any halibut that is harvested with setline or other hook-and-line gear while commercial fishing in any IFQ regulatory area, where setline means one or more stationary, buoyed, and anchored lines with hooks attached. In comparison, longline pot gear is defined as a stationary, buoyed, and anchored line with two or more pots attached, or the taking of fish by means of such a device (See Appendix 3). Draft revisions and additions to Federal regulations that would be necessary to retain halibut IFQ with pot longline gear in the GOA sablefish IFQ fishery are provided below. NMFS will draft regulations that would implement the other elements of the preferred alternative either with or without

permission to retain halibut that is caught in sablefish pots, depending on whether the IPHC chooses to redefine legal gear for halibut through a complementary action.

If Element 4 is excluded from draft regulations, NMFS would add a prohibition §679.7(a)(13)(v) to prohibit halibut retention in pot longline gear used in the GOA sablefish IFQ fishery, and exclude proposed changes to regulations at §679.2 and prohibitions at §679.7(a)(6) and (a)(13).

Currently, legal size halibut caught incidentally in the GOA HAL sablefish fishery must be retained if any permit holder on the vessel has unharvested halibut IFQ. The procedures NMFS uses to verify that sufficient halibut IFQ are held by permit holders onboard a HAL vessel fishing sablefish could be used for a vessel fishing sablefish IFQ with pot longline gear. Since IFQ are specific to regulatory area and vessel size category, the amount of halibut retained and landed by a vessel is crosschecked against the IFQ permit database to verify that the permit holder's IFQ balance is sufficient for regulatory area and vessel size. In addition, OLE can reference information in NMFS logbooks and IPHC logbooks at the time of landing.

With the Council having selected Element 4 as part of the preferred alternative, and if the IPHC redefines legal gear, NMFS would require that the lengths of halibut retained onboard a pot longline vessel be at or above the commercial size limit. IPHC regulates the size limit of halibut in Section 13 of the halibut annual management measures. Observers collect data on retained halibut, such as number, length, and viability. However, observers would not be onboard all vessels fishing. Thus, retention of legal-size halibut could only be verified on a portion of the vessels fishing. NMFS notes that this situation currently exists in the halibut IFQ fishery – observers are not deployed on all vessels to verify that all legal-size halibut are retained. Landings of legal-size halibut on unobserved vessels could be verified through OLE dockside inspections of the catch, as well as reviewing mandatory logbooks at the time of landing. OLE currently completes dockside inspections of the HAL sablefish IFQ fishery, and anticipates this practice could be continued for pot longline gear vessels in a GOA sablefish IFQ fishery. As noted in Section 4.5.4, it is common for offloads to contain both sablefish and halibut IFQ landings, so OLE would not expect difficulty in enforcing fishing activities allowed under Element 4.

4.9.7 Effect on Management in State of Alaska Waters

The state-waters AI sablefish fishery includes state waters of the BSAI and the western portion of the WGOA. Pot longline gear is currently permitted in the BSAI portion of state waters; consistent with the area where they are allowed in Federal waters. Most state-waters sablefish participants are fishing IFQ or CDQ, so the Board of Fisheries could consider complementary action to align State regulations with Federal regulations, as potentially modified by this action, to ensure that fishermen are not subject to conflicting regulations inside and outside of three nautical miles.

4.9.8 Impacts Across Stakeholder Groups

The section assesses whether the ability to use pot longline gear, and any related benefit, is equitable across participants in the GOA sablefish IFQ fishery. Any differential impacts of allowing pot longline gear are considered in relation to their impact across harvester, processor, and community stakeholder groups.

4.9.8.1 Impacts on Harvesters

One of the Council's overarching objectives for this action, as outlined in the purpose and need statement, is to minimize gear conflicts between pot longline and the traditional HAL gear operators in the GOA sablefish IFQ fishery. In other words, the Council seeks to maintain historical fishing opportunities for

those participants who choose not to (or are not able to) convert to pot gear in attempting to mitigate the impacts of whale depredation.

It is possible 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. As noted above, the cost of re-tooling for an industry-standard pot longline operation can run well over $100,000. Smaller vessels would likely face deck space constraints, either from the pots themselves, the additional buoys/markers required, or the thicker groundlines that must be coiled on deck[59]. Peterson and Carothers (2013) surveyed over 150 sablefish longliners, and found that operators of vessels greater than 60 feet LOA were most likely to agree that the transition to pot gear is a feasible option for their business. Respondents who did not feel that conversion to pot gear was a realistic depredation response tended to be operators of small vessels fishing out of Southeast Alaska. In the Canadian sablefish pot fishery, vessels range between 55feet and 95feet LOA; all vessels that fish sablefish pots in the BSAI areas are greater than 50 feet LOA (all but two are greater than 60 feet LOA); and the majority of the vessels that participate in the WGOA and WY sablefish IFQ HAL fishery are greater than 50feet LOA. Table 44 shows that approximately 30 percent of sablefish IFQ fishermen in SEO use vessels 50 feet (15.2 m) or less LOA. This is a higher percentage of smaller vessels compared to the other GOA sablefish areas.

Vessels facing the significant initial investment of gearing up for pot longline fishing may differ in their access to capital. Vessel owners would face a private business decision on whether or not to finance new gear or vessel work. The GOA sablefish IFQ fleet tends to also fish for halibut IFQ, fixed gear Pacific cod, and state-managed fisheries (particularly directed salmon fisheries). Presumably, vessel owners with higher fishing revenues or greater capital assets would find it easier to secure financing. IFQ crewmen who own sablefish QS, but not a vessel, may find it more difficult to step up to vessel ownership if jumping up all the way to a vessel capable of fishing pots becomes the only viable way to fish sablefish IFQ in the GOA.

Individual decisions on whether or not to invest in a vessel reconfiguration might also be affected by whether or not the Council recommends the allowance of pot longline gear in all GOA areas (preferred alternative) or whether pot longline gear is allowed only in select areas. If pot longline gear was allowed only in some areas, vessel owners who hold QS throughout the GOA would have to determine whether switching gear types during the season provides more cost than benefit. Table 31 in Section 4.5.6 shows that sablefish participants in all GOA areas are harvesting IFQ across multiple areas; Table 32 shows vessel-level activity that spans GOA areas. An individual who holds only a small amount of QS in the area (or areas) that does not allow pot longline gear might opt to lease or sell that quota rather than making a mid-season gear changeover. Under a scenario where pot longline gear is not allowed in one of the four GOA areas, a vessel owner who needs to fish all of his or her annual IFQ to turn a profit would likely not use pot longline gear at all; thus, receiving no benefit from the action in terms of mitigating whale depredation. A less marginal operator might simply sell or lease that quota, perhaps adding QS market supply in the non-pot area and slightly reducing the area's quota prices. If pot longline gear is only allowed in select areas, vessel owners who have made the investment in pot longline fishing might be more apt to compete for additional QS in those areas, potentially increasing the market price.

Vessels that already fish pots in other fisheries, such as the Pacific cod fishery or the BSAI sablefish pot fishery would, presumably, face lower conversion costs than those that do not. On an area basis, the

[59] Anecdotal reports to staff indicate that HAL groundline is typically 1/4"', 9/32", or 3/8" in diameter, which pot longlines use a groundline that is 3/4" to 1" in diameter. Small vessels that might be able to run shrimp pots or even Pacific cod pots might still not be able to accommodate sablefish pot gear, since the deeper fishing depth would require significantly more line.

Southeast Alaska fleet would likely face the longest build-up period in establishing pot gear operations. In the meantime, vessels that are already capable of fishing pot longlines and that own or purchase sablefish IFQ for that area could impact the existing SEO HAL fleet by preempting grounds, and potentially concentrating whale depredation onto those non-pot vessels remain in the fishery.

If fishing sablefish IFQ with pot longline gear emerges as a dominant strategy, perhaps concentrating whale depredation onto remaining HAL gear, direct costs and opportunity costs for non-pot participants could increase relative to the status quo. In the extreme, fishing with HAL gear could become less profitable. If operating margins for non-pot participants fall below the profitability line, vessel owners could choose to forgo the cost of operating their own vessel and "walk on" to vessels able to fish pot longline gear, thus, reducing the number of active vessels in the fleet. Operators unable to convert to pot longline gear might choose to sell their QS, which could also lead to consolidation in the fleet. Consolidation of permit holders onto fewer vessels might actually increase the number of vessels that switch to pot longline gear. Amortizing the expense of switching to pot longline gear could be more manageable if the vessel were fishing a larger amount of IFQ each year.

Fleet consolidation would be the most apparent threat to the number of available crew jobs. Pot operations do not seem to have inherently more or fewer crew on board than do HAL vessels. Table 41 in Section 4.5.6 showed that crew size on pot and HAL boats in the BSAI and GOA Pacific cod fisheries – a close analog in terms of vessel operation – was roughly similar within each vessel size class.

Presuming that the conversion of some of the GOA sablefish fleet to pot longline gear reduces unaccounted whale depredation, and consequently reduces uncertainty in sablefish stock abundance indices, future TAC levels may increase. Transfer prices for the QS that underlie annual sablefish IFQ are based on perception of the future harvest opportunities in the fishery, so expectations of higher TACs could have a positive effect on QS value. Current QS holders would benefit from the enhanced value of their tradable asset, though individuals looking to purchase QS on the transfer market – such as new entrants, holders of small QS amounts, or crew members – might encounter higher barriers to entry. The market price for sablefish QS has remained high, even during recent declines in the amount of harvestable biomass (increasing QS:IFQ ratio), suggesting that barriers to entry for those who did not receive initial program allocations are already high.

The Council heard testimony expressing concern that increased concentration of whale depredation onto remaining HAL gear and fleet consolidation were more likely in the SEO area due to the more constrained fishing grounds. However, in developing the preferred alternative, the Council determined that these outcomes were unlikely based on the estimated cost information for converting a vessel to using longline pot gear (Section 4.9.2) and described above, and testimony from SEO operators indicating that the majority of fishermen in that area likely would not be able to switch to longline pot gear and would continue to use hook-and-line gear in the sablefish fishery.

4.9.8.2 Impacts on Processors

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. There is some potential for the redistribution of catch if vessels that are more suitable for pot longline fishing achieve better outcomes to such an extent that smaller HAL operations "walk on" to other vessels or sell their QS to operators who deliver to a different plant within the same management area. However, such outcomes are only likely if the introduction of pot gear adversely impacts the HAL fleet to the most extreme extent imaginable. The more likely distributive impacts of Alternative 2 relate to grounds preemption, and the potential for concentrated depredation on the remaining HAL gear in the fishery; neither of those outcomes would be expected to impact processors.

Sablefish caught with pot longline gear are not expected to be significantly larger or smaller, on average, than those caught with HAL gear. As a result, processors would not likely have to alter their mix of product forms to suit a different average sized fish.

The impact of a shift to pot longline gear on delivered sablefish quality is not clear, based on available information. It is assumed that ex-vessel prices would remain similar to status quo levels, at least in the near-term. The best available information on ex-vessel prices by gear type, which obviously does not include pot-caught GOA sablefish, indicates that average prices paid to pot fishermen are somewhat lower than those paid to HAL fishermen. If this differential applied to pot-caught sablefish, although there is no empirical evidence to suggest it would, then the considered action could increase margins for processing plants in the short-term if the wholesale revenues generated from each gear type were similar, all else equal.

Finally, if unaccounted whale depredation mortality decreases due to the use of pot gear, processors would benefit from increased TACs in the same manner as harvesters. However, marginal returns may be diminishing with increased sablefish production. Nominal average annual ex-vessel prices for sablefish in all areas have been in decline since their peak in 2011. Ex-vessel prices have many determinant factors in addition to the quantity supplied to the market. Nevertheless, one might conclude that demand for sablefish on the world market is, at some point, satiable.

4.9.8.3 Impacts on Communities

Potential impacts on communities follow the same logic as those described for processors. The likely first-order distributive impacts of Alternative 2 relate to grounds preemption and competitive advantages that might be gained by vessel owners who are more able to use pot gear in a fishery affected by whale depredation. Consolidation in the fishery or redistribution of landings is only likely if vessels using pot gear become more effective than vessels using HAL gear to an extreme degree, such that QS holders sell out of the fishery or choose to walk on to vessel with pot gear instead of fishing from their own HAL platform.

If fleet consolidation were to occur, communities that rank highly in processor reliance but not in processor engagement (i.e. the community receives a small amount of deliveries, but that activity makes up a significant portion of the community's economic activity) would be among the most at risk. Those communities include Elfin Cove, Port Alexander, Akhiok, Excursion Inlet, and False Pass (Table 42). The sablefish IFQ fishery is not a derby, and delivery requirements are not part of the IFQ Program, so the risk of losing deliveries to a small community has been present since the outset of the Program, and conversion to pot gear is not one of the most likely factors to alter delivery patterns that have persisted for almost 20 years.

GOA communities with shipyard operations might benefit from the removal of pot gear restrictions, as vessels may need to be re-fitted or modified in order to carry, launch, and haul pot longline gear.

4.9.9 Impacts on Tax Revenues

Some municipalities levy taxes on fish first landed at processing plants located in their community. According to the State of Alaska's Department of Commerce[60], seven GOA municipalities or boroughs levy a raw fish tax or a severance tax on the extraction of natural resources: False Pass, King Cove, Sand Point, Unalaska, Yakutat, Aleutians East Borough, and Kodiak Island Borough. The factors that might

[60] http://www.commerce.state.ak.us/dca/osa/pub/12Taxable.pdf

drive the redistribution of landings across GOA communities, described above in the summary of Impacts on Processors (Section 4.9.8.2), could impact these communities in the form of foregone tax revenue, in addition to impacts on employment and the social makeup of the community. Such impacts, if they emerge, should be viewed as inter-community transfers, rather than as costs of the considered action. However, the aggregate amount of municipal raw fish tax could decrease if sablefish landings shift from localities that do levy a tax to ones that do not. Ten GOA communities are rated as "highly reliant" on commercial sablefish processing (Table 42), and thus would be reliant on the tax base generated by landings at those facilities. King Cove, Sand Point, False Pass, and Yakutat are among those reliant communities that levy a fish tax. Akhiok is also a "highly reliant" community, and it is located in the Kodiak Island Borough where there is a Borough tax.

The State of Alaska also levies raw fish taxes. Some of those revenues may go back into communities through State expenditures. There are three fisheries taxes that are levied on groundfish catch by the State of Alaska. The descriptions of the state taxes were taken from the Alaska Department of Revenue Tax Division website[61], and are provided below.

1) A **Fisheries Business Tax** is levied on persons who process or export fisheries resources from Alaska. The tax is based on the price paid to commercial fishermen, or fair market value when there is not an arms-length transaction. Fisheries business tax is collected primarily from licensed processors and persons who export fish from Alaska. Shore-based processors are assessed at a rate of 3 percent, and floating processors are assessed at a rate of 5 percent of the ex-vessel price paid to fishermen.

2) A **Fishery Resource Landing Tax** is levied on fishery resources processed outside the 3-mile limit and first landed in Alaska or any processed fishery resource subject to sec. 210(f) of the American Fisheries Act. The tax is based on the unprocessed value of the resource, which is determined by multiplying a statewide average price (determined by the Alaska Department of Fish and Game data) by the unprocessed weight. The Fishery Resource Landing Tax is collected primarily from factory trawlers and floating processors which process fishery resources outside of the state's 3-mile limit and bring their products into Alaska for transshipment. The Fishery Resource Landing Tax is also levied at a rate of 3 percent of ex-vessel value.

3) A **Seafood Marketing Assessment** is levied at a rate of 0.5 percent of the value of seafood processed products first landed in, or exported from Alaska. The Seafood Marketing Assessment is based upon the first wholesale value of seafood products, regardless of whether the products were processed at sea or on shore.

Because the total amount of sablefish IFQ harvested under Alternative 2 (including the preferred alternative) is not expected to differ from the status quo, the amount of State tax revenues derived from the fishery should not be impacted by the Council's selection of the action alternative. Within Alaska, the location of the first landing would not alter the amount of tax revenue collected, so any distributional impacts of the action would not change the total amount. If the use of pot longline gear reduces the uncertainty in sablefish abundance indices caused by unaccounted whale depredation, and if that in turn leads to higher TACs, then Alternative 2 could have the medium- to long-term effect of increasing State tax revenues.

Alternative 2 (including the preferred alternative) is not expected to cause a greater percentage of GOA sablefish IFQ to be landed outside of Alaska. Section 4.5.3 notes that landings outside of Alaska have typically been made by larger vessels, which, as a class, might benefit from the ability to use pot longline

[61] http://www.tax.alaska.gov/programs/programs/index.aspx?60620

gear. However, interstate deliveries made by those larger vessels have historically accounted for only a small portion of their total annual deliveries. Sablefish is a high value, perishable product that demands careful handling; so motivation to transport the pre-processed catch to distant, out-of-state ports is likely low and would not be expected to increase under Alternative 2. Dating back to 2009, no vessels in this fishery have delivered solely outside of Alaska, and there is no clear reason that switching from HAL to pot longline gear would change those business patterns.

4.10 Council's Preferred Alternative

The Council selected a preferred alternative at its April 2015 meeting. The text selected from the analyzed action alternative (Alternative 2), as amended, is included in this document at Sections 2.2 and 4.3.2. This section articulates the Council's rationale for its recommendation, as compared to the no action alternative (Alternative 1), and parts of Alternative 2 that were not included in the preferred alternative.

The Council recognized that pot gear had previously been permitted in the GOA sablefish fishery, but its use was prohibited by GOA Groundfish FMP Amendment 14, in 1985. During scoping and deliberation, the Council noted that the previous determination on pot gear was based on fishery data and scientific information on whale depredation that is not reflective of the present fishery. Reports and observations of whale depredation off of HAL gear have increased (Section 3.4), and the fishery is now managed with individual fishing quotas under the Halibut and Sablefish IFQ Program. In short, the existing management regime for the fishery allows for new management measures that, to a degree, may rely upon coordination and cooperation within the fleet.

The Council's preferred alternative permits the use of pot longline gear in all GOA management areas (SEO, WY, CGOA, and WGOA), with varying limits and requirements for gear deployment. The Council heard stakeholder concerns about the introduction of pot longline gear alongside HAL gear in the SEO district. Those concerns are addressed through the lower pot limits under Element 1, shorter gear retrieval requirements under Element 2, and commitment to reviewing the development of the pot longline fishery within three years of implementation. The Council noted several disadvantages of introducing pot longline gear incrementally by management area. Among those, many vessels currently operate in more than one area (Section 4.5.6); prohibiting pot longline gear in a portion of a vessel's fishing area would discourage capital investment and the building of management capacity for a new gear group that could further the Council's objective of addressing whale depredation.

In developing this action, the Council received testimony related to the potential for gear conflicts and grounds preemption. The testimony focused on concerns about gear conflicts and grounds preemption in the SEO and, to a lesser degree, the WY area. The testimony indicated that vessel operators using hook-and-line gear could incur increased operating costs if their vessels would have to travel farther or to less productive fishing grounds to find an area unoccupied by longline pot gear. The testimony suggested that these costs could potentially be greater for participants in the SEO and WY sablefish areas because in these sablefish areas, fishing grounds are constrained to a narrow area on the edge of the continental shelf and fishing gear is concentrated into a relatively smaller area compared to the CGOA and WGOA sablefish areas. Section 4.9.4 notes that fishery data is not available at a sufficiently fine spatial scale to identify particular areas where competition for fishing grounds may occur in the SEO and WY sablefish areas.

It is not possible to determine with certainty the extent to which gear conflicts and grounds preemption might occur under the preferred alternative because it is unknown how many vessel operators will use longline pot gear in the GOA sablefish IFQ fishery. After reviewing the analysis and receiving public testimony, the Council determined the likelihood of gear conflicts and grounds preemption was low under the preferred alternative. However, the likelihood of gear conflicts and grounds preemption is not

possible to determine with certainty. The Council received testimony from several stakeholders noting this uncertainty and expressing concern that the preferred alternative would negatively impact fishermen who continue to use hook-and-line gear. These stakeholders requested specific measures to further minimize the likelihood of gear conflicts and grounds preemption. In addition, the Council considered testimony indicating that all fishermen have an economic incentive to avoid gear conflicts on the fishing grounds because these conflicts can result in costs through lost gear and lost fishing time. Based on this information, the Council adopted the specific measures to address these stakeholder concerns by recommending a number of management measures that are intended to minimize the potential for gear conflicts and grounds preemption.

The Council's recommendation on Element 1 – pot limits and pot tags – reflects that some management areas tend to have more vessels operating in a constrained area, with greater competition for productive grounds. Allowing each vessel to fish a large number of pots, even in a longline format, would exacerbate grounds preemption and raise the likelihood of gear conflict, which inherently disadvantages operators who continue to use HAL gear. The fishing grounds off of SEO and WY are more spatially constrained due to the narrow width of the slope at sablefish fishing depth, roughly 250 to 500 fathoms (Figure 32). Moreover, the portion of the GOA sablefish fleet that is most active in those areas includes a high proportion of small vessels that fish short trips out of Southeast communities, and which would not be able to adopt pot longline gear due to vessel size constraints. The Council considered area-specific pot limits to account for the physical nature of the sablefish fishing grounds and the composition of the IFQ sablefish fleet in each sablefish area. The Council also considered testimony on the number of pots that vessels in the GOA could feasibly deploy in the sablefish IFQ fishery. The Council determined that smaller pot limits are appropriate in the SEO and WY fisheries because these sablefish areas have more spatially concentrated fishing grounds than the CGOA and WGOA sablefish areas. Therefore, the preferred alternative specifies a limit of 120 pots in the SEO and WY areas and a limit of 300 pots in the CGOA and WGOA area.

The Council is adopting a precautionary approach by recommending lower vessel-based pot limits in those areas, relative to the CGOA and WGOA. The Council noted that it might revisit the pot limit in the future, after closely monitoring the deployment of pots in SEO and WY for several years. Intense competition for fishing grounds (via preemption) or high incidence of gear conflict might indicate that pot limits are too high. Reported or observable inefficiencies – meaning that fishermen are taking more trips than would be necessary to safely and effectively harvest their IFQ – would indicate that pot limits are too low. The Council recommended a pot tag system as the most economical way to enforce a pot limit. Requiring gear to be tagged and counted while in port will prevent vessels from sharing or handing-off gear at sea, which would exacerbate the effect of grounds preemption. Requiring that re-registration of pots from one vessel to another occur while in port should have the desired effect. The Council also noted that allowances for gear sharing could be considered in the future, as the impacts of grounds preemption and the limitations of available monitoring capabilities become known.

The Council tailored Element 2 – gear retrieval requirements – by area, as a similar acknowledgement that vessel operations and fishing grounds vary by management areas. Gear is permitted to be left on the fishing grounds for the longest period of time (7 days) in the WGOA, where fewer vessels operate across a greater expanse. At the other extreme, vessels fishing pot longline gear in SEO may not leave gear on the grounds when that vessel makes a delivery. The Council determined that the preferred alternative would minimize the potential for gear conflicts and grounds preemption. For each area of the GOA, the preferred alternative would specify a maximum time limit for which longline pot gear could be left unattended on the fishing grounds. The Council determined that requiring vessel operators to tend the gear within a specified time period reduces the likelihood that longline pot gear will be left on the grounds unattended for an extended period of time.

In addition to information on pot soak times in the BSAI sablefish fishery presented in Section 4.2, the Council considered testimony from vessel operators. This testimony suggested it was unlikely that vessels using pot gear would preempt fishing grounds in the GOA by leaving pot gear deployed for extended periods of time because 1) longline pot gear likely would be deployed in the GOA sablefish IFQ fishery from two to four days, similar to operations in the BSAI fisheries, 2) gear conflicts and grounds preemption has not occurred in the BSAI sablefish IFQ fishery, and 3) vessel operators have an incentive to optimize their pot gear fishing effort to maximize their sablefish IFQ harvest in the minimum amount of time.

Nevertheless, these vessel operators acknowledged to the Council that the likelihood of gear conflicts and grounds preemption cannot be determined with certainty. These vessel operators also noted that many GOA sablefish IFQ holders intending to continue to use hook-and-line gear were concerned about the potential for gear conflicts and grounds preemption under the preferred alternative. These operators noted that these concerns likely were greater for the GOA sablefish IFQ fishery than the BSAI sablefish IFQ fishery because some GOA sablefish areas have more constrained fishing grounds due to a smaller overall area and a larger number of participating vessels than in the BSAI. To address this concern, several sablefish IFQ holders recommended that the Council establish area-specific requirements for catcher vessels and catcher/processors to redeploy or remove gear from the grounds in order to further reduce the likelihood that longline pot gear would be deployed on the GOA fishing grounds for extended periods of time and result in gear conflicts and grounds preemption.

The Council determined that establishing these gear redeployment or removal limits would provide an additional incentive for operators using longline pot gear to closely monitor the amount of time their gear is left on the grounds and further minimize potential for gear conflicts or grounds preemption. The Council recommended these provisions in the preferred alternative to balance its objective to provide economic benefits to fishermen using longline pot gear with its objective to minimize potential negative impacts on fishermen continuing to use hook-and-line gear. Element 2 of the preferred alternative includes specific provisions to address concerns about gear conflicts and grounds preemption in the SEO sablefish area. In that area, a catcher vessel operator would be required to remove longline pot gear from the fishing grounds when the vessel leaves the fishing grounds to make a landing. This would prohibit the vessel operator from preempting fishing grounds by retrieving pots and redeploying the gear in the same fishing location while the vessel made a landing. This restriction responds to concerns expressed by fishermen holding sablefish IFQ in the SEO sablefish area. These fishermen testified that a substantial portion of sablefish IFQ fishermen in SEO likely would continue to use hook-and-line gear under this proposed rule because the vessels are too small to feasibly use longline pot gear.

Section 4.9.8.1 notes that vessels ranging from between 55 feet (16.7 m) and 95 feet (28.9 m) length overall (LOA) participate in sablefish pot fisheries in Canada. The majority of the vessels that participate in sablefish fisheries in the GOA are greater than 50 feet (15.2 m) LOA, indicating that these vessels may be able to feasibly use longline pot gear. Approximately 30 percent of sablefish IFQ fishermen in SEO use vessels 50 feet (15.2 m) or less LOA. This is a higher percentage of smaller vessels compared to the other GOA sablefish areas. Therefore, the Council determined that Element 2, requiring a vessel in the SEO sablefish area to remove longline pot gear from the fishing grounds when the vessel leaves the fishing grounds to make a landing, would minimize the potential for grounds preemption while providing fishermen using longline pot gear with an opportunity to efficiently harvest sablefish.

The Council also considered the analysis and testimony when recommending the gear retrieval requirements for the WY, CGOA, and WGOA areas. The Council determined that the fishing grounds are less constrained in these areas relative to SEO due to fewer IFQ holders, larger fishing grounds, or both. Therefore, the Council determined that it was not necessary to require fishermen using longline pot gear in these areas to remove their gear from the fishing grounds when making a landing. The Council based

this decision on testimony from operators in these areas indicating that fishing vessels were much further from port in these areas relative to the SEO area and requiring a vessel to return to and retrieve its gear by a certain day could, in some circumstances, force vessels to operate in unsafe or unfavorable conditions. Aside from weather, a short soak limit could reduce a skipper's ability to fish an optimal gear rotation if the vessel's strings are spaced out over a large geographical area, or if the skipper determines that a particularly long soak time yields larger fish in that area. Based on this testimony and the pot soak times in the BSAI sablefish fishery presented in Section 4.2, the Council determined that requiring vessel operators to tend their gear within a maximum period of time would meet its objective to minimize the potential for longline pot gear to be left unattended on the fishing grounds for an extended period of time in these areas.

The Council determined that five days was an appropriate period of time in WY and CGOA because the Council heard testimony from operators intending to use longline pot gear that this would accommodate sablefish vessel fishing plans to soak pots for two to four days, while allowing additional time to redeploy or remove gear in the event of poor weather or operational delays. The Council determined that this requirement to redeploy or remove gear at least every five days would minimize the likelihood that one vessel would preempt the same fishing grounds for an extended period of time.

In the WY and CGOA sablefish areas, a vessel would be required to redeploy or remove longline pot gear from the fishing grounds within five days after deploying the gear. The Council received testimony that this would be an appropriate time period because it is unlikely that a vessel operator would leave fishing gear unattended for longer than five days in the WY and CGOA sablefish areas. The Council determined that five days was an appropriate period of time because the Council heard testimony from operators intending to use longline pot gear that this would accommodate sablefish vessel fishing plans to soak pots for two to four days while allowing additional time to redeploy or remove gear in the event of poor weather or operational delays.

The Council considered testimony indicating that, although the fishing grounds in WY are spatially constrained, similar to SEO, the likelihood of grounds preemption in WY is lower because there are fewer IFQ permit holders in that area than in SEO. Therefore, the Council determined that it would not be necessary to require a vessel operator to remove longline pot gear from WY area grounds when the vessel made a landing. The Council received testimony that fishing grounds are not as limited in the WY and CGOA sablefish areas, and grounds preemption likely would not occur under the preferred alternative.
In the WGOA sablefish area, a vessel would be required to redeploy or remove longline pot gear from the fishing grounds within seven days after deploying the gear. The Council received testimony that this would be an appropriate time period because while it was unlikely that a vessel operator would leave fishing gear unattended for longer than seven days in the WGOA, the preferred alternative would provide a maximum time limit for which longline pot gear could be left unattended on the fishing grounds. The Council provided a longer time period in the WGOA for operators to redeploy or remove longline pot gear relative to the other sablefish areas because the WGOA is the largest GOA sablefish area and there are substantially fewer sablefish IFQ holders in the WGOA than in SEO and the CGOA. The Council received testimony that fishing grounds are not constrained in the WGOA and grounds preemption likely would not occur under the preferred alternative.

The Council noted that gear retrieval exceptions for poor weather or human casualties already exist in regulation. Throughout the iterative decision-making process, the Council recognized that vessel length is not a good proxy for pot-carrying capacity; longer vessels with a narrow beam could actually be less safe when carrying a large load of pots and groundline. As a result, structuring gear retrieval requirements around vessel size was judged not to be equitable or an appropriate policy to promote human safety. The Council and its Enforcement Committee noted that enforcement of gear retrieval regulations will require the use of multiple monitoring tools: logbooks, VMS, Prior Notice of Landing (PNOL), and the work of

enforcement agents speaking with vessel operators and crew while at-sea and in port. VMS will help enforcement track the management areas in which vessels are fishing on a given trip, and agents could then follow up with a dockside inspection to see what gear was returned to shore when making a landing. That information could be compared to the recorded number of pots that are registered to the vessel for that area, or areas, in the pot tag database. A PNOL is an additional tool to help enforcement track gear retrieval, and would give agents a declaration against which to compare the gear that they count while the vessel is making a port landing.

Sections 4.9.3.2, 4.9.4.1, 4.9.5.1, and 4.9.6.1 describe enforcement considerations for specific provisions of the preferred alternative that are intended to minimize gear conflicts and grounds preemption. The Council considered the methods that would be used to enforce the proposed restrictions on use of longline pot gear in the GOA sablefish IFQ fishery and advice from its Enforcement Committee. The Council determined that the requirements in the preferred alternative would provide sufficient monitoring and enforcement information to meet the Council's objectives for the proposed action.

Under Element 3, the Council recommended several gear specifications that are meant to distinguish pot longline gear from other fixed gear, when set on the fishing grounds. These specifications include four-buoy clusters, flagpoles, and radar reflectors. Buoys must be marked with information that identifies the vessel or the IFQ permit holder associated with that vessel. "Radar reflectors" are not defined beyond a general definition (performance standard), so as not to unintentionally impede the development of more effective, less costly, or more durable technologies. Four-buoy clusters and flagpoles are also intended to reduce unintentional gear conflict by enhancing the visibility of the gear-ends to other vessels that are physically present on the fishing grounds. Using multiple buoys should help keep the gear marker above the water line in stronger currents, the force of which might otherwise submerge a single buoy by dragging on the anchor line.

The Council received testimony that these marking requirements would enhance the visibility of the ends of a longline pot gear set to other vessels that are on the fishing grounds and would not impose a substantial cost on vessel operators using longline pot gear. The testimony indicated that these marking tools are commonly used by vessel operators that deploy pot gear in fisheries in Alaska.

The Council did not recommend the use of gear marking technology that is detected and disseminated through AIS or satellite signals. NMFS stated that it would not be able to directly administer such a program, as the agency is unable to share confidential information on gear location. Moreover, marking gear (or other objects that are not self-propelled vessels) is not a use of AIS that is approved by the international governing authority (ITU). The fleet's independent and voluntary use of this, or similar, technology in the future would still be encouraged as long as it is not in conflict with other maritime regulations.

The Council recommended Element 4 – retention of incidentally caught legal-size halibut – with the understanding that its implementation requires complementary rulemaking by IPHC. The Council stated its preference for the IPHC to include pot longlines in the definition of legal gear for commercial halibut fishing, at least in the GOA. Without such a change, any halibut caught in sablefish pots would become a regulatory discard. A vessel targeting sablefish with HAL gear could retain and sell legal-size incidentally caught halibut, so long as an individual onboard possesses the necessary halibut IFQ. Extending that efficiency of retention to vessels using pot longlines could benefit the resource by reducing waste.

The Council acknowledged the iterative nature of developing a new gear sector within an existing fishery (GOA sablefish pot longlines). The Council also recognized the role that the fleet will play in cooperating to minimize gear conflict and grounds preemption. Given that NMFS cannot collect and share real-time gear location data, nor can it require pot longline gear users to join a cooperative that shares such

information, the Council has formally encouraged the IFQ holders who elect to use pot longlines to work together towards industry-based reporting protocols that enhance the well-being of humans, ensure the adoption of the best available technologies, and that do not disadvantage HAL vessels. To the best of its ability – and without specifying technology so closely as to discourage innovation – the Council has recommended management tools that should make gear visible to fishermen and monitoring agencies, and management measures that aim to keep the ground from becoming overcrowded. By committing to a three-year review, the Council has signaled to those who would adopt pot longline gear that their cooperation and innovation will be monitored; by the same token the Council has signaled to those who cannot or will not switch to pot longline gear that it will be responsive to impacts upon their ability to fish safely and competitively. During deliberation, the Council specifically noted that its three-year review will track negative impacts on communities, if any, or changes in the price of sablefish quota share that might adversely affect new entrants or small-scale operators looking to grow their business.

4.11 Summation of the Alternatives with Respect to Net Benefit to the Nation

If the Council had selected "no action" (Alternative 1) as its preferred alternative – the baseline against which the selected preferred alternative is compared – HAL gear would remain the only legal gear for the harvest of GOA sablefish IFQ. Net benefits would not change from the status quo under that outcome. The IFQ fishery would continue to operate in its current manner: whale depredation would continue to impose direct and opportunity costs on IFQ fishermen, HAL bycatch of other groundfish species would presumably continue unchanged from their present rates, and incidences of seabird interaction with HAL gear would continue to occur at present levels.

Under the preferred alternative, pot longline gear would be permitted in the GOA sablefish IFQ fishery, but would not be required. Given the diversity in the size and configuration of the vessels, and the differential access to capital of the vessel owners in the fleet, it is likely that the fishery will be prosecuted with two different gear types deployed in the same management areas. The Council did not recommend that pot longline gear be allowed only in certain GOA areas. Disallowing pot gear in a particular area might protect non-pot participants from the potential risks of gear conflict and grounds preemption – the extent of which are unknown – but it would likely discourage adoption of the new gear type, and would also complicate management and enforcement. Segmenting the regulation of sablefish gear by management area creates operational challenges for fishermen whose annual business plan involves harvesting across multiple GOA management areas.

The likely benefits of replacing some HAL effort with pot longline effort are aligned with the Council's purpose and need for this action – namely, to reduce the amount of whale and seabird interaction with sablefish fishing gear in the GOA. The fact that pot gear would only be permitted in a longline format means that the number of buoy lines with which marine mammals might become entangled would not increase, relative to the status quo of HAL longline fishing. As a result, marine mammals and seabirds would experience a marginal benefit (an outcome in which the Council has also expressed an interest), and those sablefish IFQ harvesters who use pot longline gear will have mitigated the depredation events that depress their CPUE. Incidental catch, PSC, and bycatch of other fish species that are commonly taken with HAL gear, but encountered less often with pot gear (e.g., halibut, rockfish, and skates), should decrease in the aggregate. More of those species would be available to users in their directed fisheries, benefitting sablefish IFQ participants who are active in those fisheries, as well as other commercial, subsistence, and recreational groups. The amount of sablefish that is depredated off of HAL gear without being accounted in stock abundance indices would decrease as less HAL gear is deployed, thereby improving the precision of stock management and potentially allowing for larger harvest limits in the future. Increasing the harvestable biomass by reducing scientific uncertainty benefits not only commercial

fishermen, but also recreational and subsistence users. Consumers of sablefish products would benefit from having more fish on the market. Even if product prices are elastic (relatively unchanged even when market supply increases), consumers would derive some benefit from sablefish being managed for sustainability, with a better set of information on mortality.

Participants who are not able to fish pot longline gear on their vessels – due to either financial or operational constraints – would not experience the same benefit of reduced whale depredation. In fact, it is possible that they would experience greater rates of depredation as the sablefish hooked on HAL gear becomes concentrated on fewer vessels in a given area. Therefore, the preferred alternative could result in some distributional impacts. Those impacts are likely to affect smaller vessels in the sablefish IFQ fleet, though some large vessels may also find it difficult to convert to pot gear. Furthermore, allowing two gear types in the same areas could increase the likelihood of gear conflicts in which HAL gear is at risk of damage or loss. The preferred alternative includes elements that are intended to reduce the likelihood of gear conflict: specifications for the marking of gear, reporting of lost gear through the pot tag program, and encouragement for the fleet to develop electronic reporting protocols within the industry. Voluntary industry cooperation will be crucial to avoiding gear conflicts.

Because pot longline fishing for sablefish has not been permitted in the GOA during the IFQ management regime, this analysis lacks some information that would allow for a definitive assessment of whether or not pot fishing will actually generate greater net benefits. GOA data on sablefish pot longline catch rates, length frequency, and ex-vessel prices are not available. On the other hand, it is known that fitting a vessel with pot longline gear will be costly. Lacking some information, it is not clear that investments in setting up a pot longline operation will return a net benefit in the form of reduced gear damage and reduced opportunity costs incurred when avoiding whale depredation.

Based on the analysis and criteria under E.O. 12866, there might be some distributional impacts among the various affected participants. Precisely what, when, and how great these impacts might be is an empirical question. The qualitative benefits of reduced whale and seabird interactions are likely to be achieved under the preferred alternative. The balance of benefits between pot longline and HAL sablefish fishermen is, at this point, less obvious due to limited data.

5 Magnuson-Stevens Act and FMP Considerations

5.1 Magnuson-Stevens Act National Standards

Below are the 10 National Standards as contained in the Magnuson-Stevens Fishery Conservation and Management Act (MSA), and a brief discussion of how the Council's preferred alternative (Section 2.2) is consistent with the National Standards, where applicable. In recommending a preferred alternative, the Council considered how to balance the national standards.

National Standard 1 — Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery.

The preferred alternative would continue conservation and management of the GOA sablefish fishery under the current harvest specification process and in-season management authority to prevent overfishing and achieve, on a continuing basis, the optimum yield from each fishery.

National Standard 2 — Conservation and management measures shall be based upon the best scientific information available.

The information in this analysis represents the most current, comprehensive information available to the Council. The preferred alternative has the potential to mitigate a source of scientific uncertainty in assessing the abundance of sablefish stocks. Whale depredation off of longline HAL gear is unaccounted mortality that may be additional to the natural levels of whale depredation on sablefish and other hooked fish. The preferred alternative is likely to reduce the amount of unaccounted mortality, to the extent that fishermen exercise the option to use pot longline gear. As a result, the information available for future conservation and management measures would be marginally improved.

National Standard 3 — To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.

Nothing in the preferred alternative would change the manner in which individual stocks are managed as a unit throughout their range, and interrelated stocks are managed as a unit or in close coordination.

National Standard 4 — Conservation and management measures shall not discriminate between residents of different states. If it becomes necessary to allocate or assign fishing privileges among various U.S. fishermen, such allocation shall be (A) fair and equitable to all such fishermen, (B) reasonably calculated to promote conservation, and (C) carried out in such a manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.

Nothing in the proposed alternatives considers residency as a criterion for the Council's decision; therefore, the preferred alternative treats all vessel owners and quota shareholders the same, regardless of residency. The preferred alternative would be implemented without discrimination among participants. To the extent that the action alternative reduces bycatch of fish species, or mitigates interaction of marine mammals and seabirds with fishing gear, the action could be considered as promoting conservation; certainly, the action is not likely to negatively impact conservation. The preferred alternative would not directly affect the allocation of fishing privileges, and, thus, cannot be said to directly create excessive shares. Any secondary effects of the preferred alternative that might relate to marginal consolidation, in the limit, and as discussed in the RIR, would still be controlled by quota share use and vessel use caps that apply to the sablefish IFQ fishery. Existing limits on excessive share accumulation would not be altered by the preferred alternative.

National Standard 5 — Conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources, except that no such measure shall have economic allocation as its sole purpose.

Relative to the status quo, the preferred alternative considers efficiency in that it seeks to mitigate the reduced catch per unit of fishing effort (CPUE) that is caused by whale depredation off of hook-and-line gear. The Council's problem statement, which motivates the preferred alternative, directly addresses reduced CPUE and increased fishing costs due to depredation. The Council's objective of providing the fleet with an additional tool to address the depredation problem is not allocative in nature, so the considered management measure cannot be said to be creating any economic allocation.

National Standard 6 — Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.

The preferred alternative would not alter the underlying management of the GOA sablefish IFQ fishery, which is structured to allow for variations in the fishery, the resource, and available catch. The increasing frequency of whale depredation is, itself, an emerging contingency. Therefore, the preferred alternative seeks to account for a change in the fishing environment by offering the fleet flexibility in the form of a new gear option.

National Standard 7 — Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.

The preferred alternative would not directly increase costs, as it merely provides the fleet with an option in gear choice. In fact, the preferred alternative could increase CPUE and limit the costs associated with whale avoidance measures. The preferred alternative is not duplicative of any existing management measures.

National Standard 8 — Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities.

The Council's problem statement implicitly recognizes the importance of the sablefish fishery to GOA communities and their residents. The preferred alternative would provide an option that improves fishing outcomes, and improves long term management of the resource by promoting increased harvesting efficiency and reduced depredation. The preferred alternative is structured in a manner that does not inherently disadvantage fishery participants who choose not to switch from HAL to pot longline gear: pot limits were recommended on an area-specific basis, and selected options seek to mitigate gear conflict and excessive grounds preemption. The potential for consolidation of fishing effort is discussed in the RIR, and the analysis concludes that such an eventuality only exists "in the limit". In other words, consolidation becomes a concern only if the frequency and severity of whale depredation increases dramatically over time, and vessels that are able to deploy pot longline gear prove to be the only viable platforms on which to target sablefish in the GOA. The analysis does not foresee a significant shift in the communities to which sablefish products are delivered, or from which sablefish vessels depart. The preferred alternative would not alter the IFQ Program's management measures that are designed to maintain a diverse fleet; those measures include area-specific quota, different quota allocations for vessel size categories, quota share use caps, and vessel IFQ caps.

National Standard 9 — Conservation and management measures shall, to the extent practicable, (A) minimize bycatch, and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.

Under the no action alternative, GOA sablefish fishermen would continue to use HAL gear. HAL gear tends to produce greater amounts of bycatch of groundfish species that are included in the GOA groundfish fishery management plan relative to pot longline gear; some of those fish are discarded (see Table 22 and Table 23 in Section 4.5.4.2). Compared to the status quo of HAL gear, the preferred alternative would allow the use of gear that is typically more selective, or allows small fish to escape. Bycatch species that are caught using pot longline gear would by physically protected from whale depredation, so the preferred alternative could be said to mitigate at least one source of bycatch mortality. Use of pot longline gear might result in higher bycatch for species like octopus and sculpin, but evidence suggests that overall bycatch across all species would be reduced under the action alternative.

National Standard 10 — Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea.

The Council considered safety during its development of the preferred alternative and safety is considered in the impacts analysis in Chapter 4. The proposed management measures were based on input from the Council's advisory bodies, including a Sablefish Gear Committee that was developed to provide advice on the development of this action, and testimony from sablefish IFQ fishery participants. While safety concerns related to carrying longline pot gear on small boats have been raised by the hook-and-line fleet based in Sitka, Alaska, the use of longline pot gear would be voluntary, and not mandatory, under this action. Longline configuration for pots was specified for this action, in part, because single pots tend to be heavier and more dangerous to handle[62]. The Council also refined the preferred alternative to remove a requirement that would have forced fishermen in all GOA management areas to carry all of their pots on deck when returning to port to make a landing. Element 2 of the preferred alternative defines area-specific maximum times for which pot longline gear may be left on the fishing grounds. The final preferred alternative reduces the amount of time that vessels would be operating under a heavier and potentially less stable load, relative to a strict "gear retrieval" requirement. The preferred alternative carefully weighs reducing the safety threat of gear entanglement with pots left on the grounds against minimum retrieval timelines that could force fishermen to remove their gear from be fishing grounds before every delivery, even in harsh weather. Vessels fishing in the SEO district of the EGOA must remove their pots from the fishing grounds when making a delivery. In developing that recommendation for SEO, the Council noted that fishing grounds in that management area are relatively close to port. Given that SEO sablefish fishing grounds are small relative to other areas, due to the slope of the shelf, the Council noted that allowing pot longline gear to be left on the grounds would create other, more imminent, safety hazards by increasing the likelihood of gear conflict.

5.2 Section 303(a)(9) Fisheries Impact Statement

Section 303(a)(9) of the Magnuson-Stevens Act requires that a fishery impact statement be prepared for each FMP amendment. A fishery impact statement is required to assess, specify, and analyze the likely effects, if any, including the cumulative conservation, economic, and social impacts, of the conservation and management measures on, and possible mitigation measures for (a) participants in the fisheries and

[62] Other rationale included the need for fewer buoy lines that could impact marine mammals, the greater likelihood of retrieving lost gear, and a smaller amount of fishing grounds preempted.

fishing communities affected by the plan amendment; (b) participants in the fisheries conducted in adjacent areas under the authority of another Council; and (c) the safety of human life at sea, including whether and to what extent such measures may affect the safety of participants in the fishery.

The EA/RIR prepared for this plan amendment constitutes the fishery impact statement. The likely effects of the Council's preferred alternative are analyzed and described throughout the EA/RIR. The effects on participants in the fisheries and fishing communities are analyzed in the RIR sections of the analysis (Sections 4 and 5). The proposed action affects the GOA sablefish IFQ fisheries in the EEZ off Alaska, which are under the jurisdiction of the North Pacific Fishery Management Council. Impacts on participants in fisheries conducted in adjacent areas under the jurisdiction of other Councils are not anticipated as a result of this action. The effects of the proposed action alternative on safety of human life at sea are evaluated in Section 6.1 under National Standard 10.

Based on the information reported in this document, there is no need to update the Fishery Impact Statement included in the FMP.

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Appendix 1. Halibut occurrence in sablefish IFQ pot fisheries by month. (Source: NMFS AKRO)

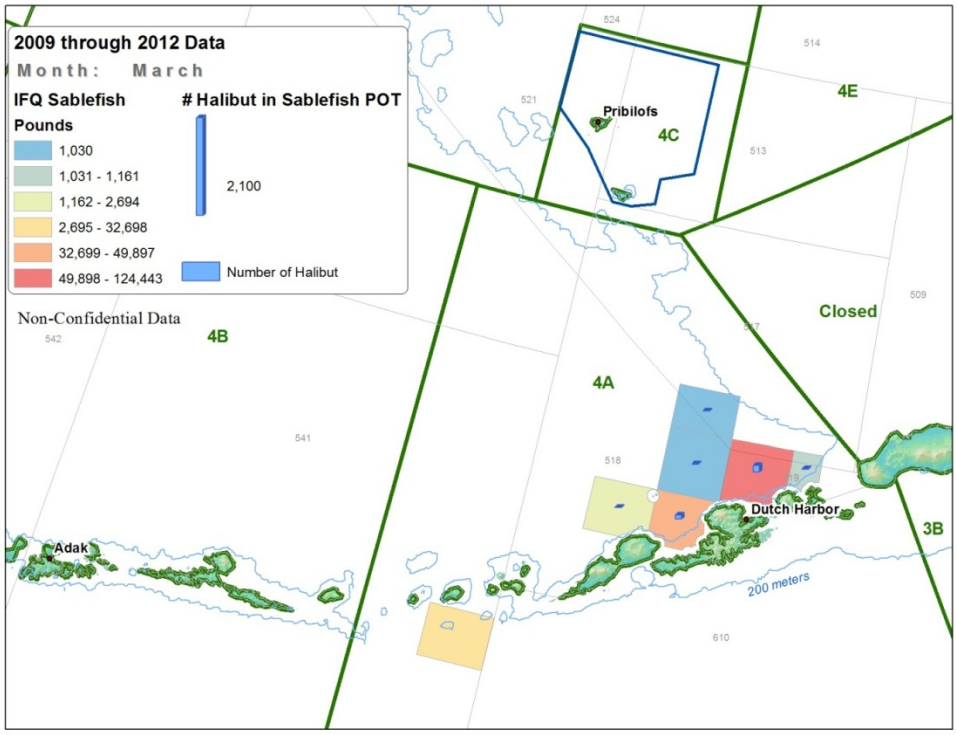


Figure 38 Number of total halibut (summed over 2009-2012) caught incidentally in IFQ sablefish fishery in pot gear by month.

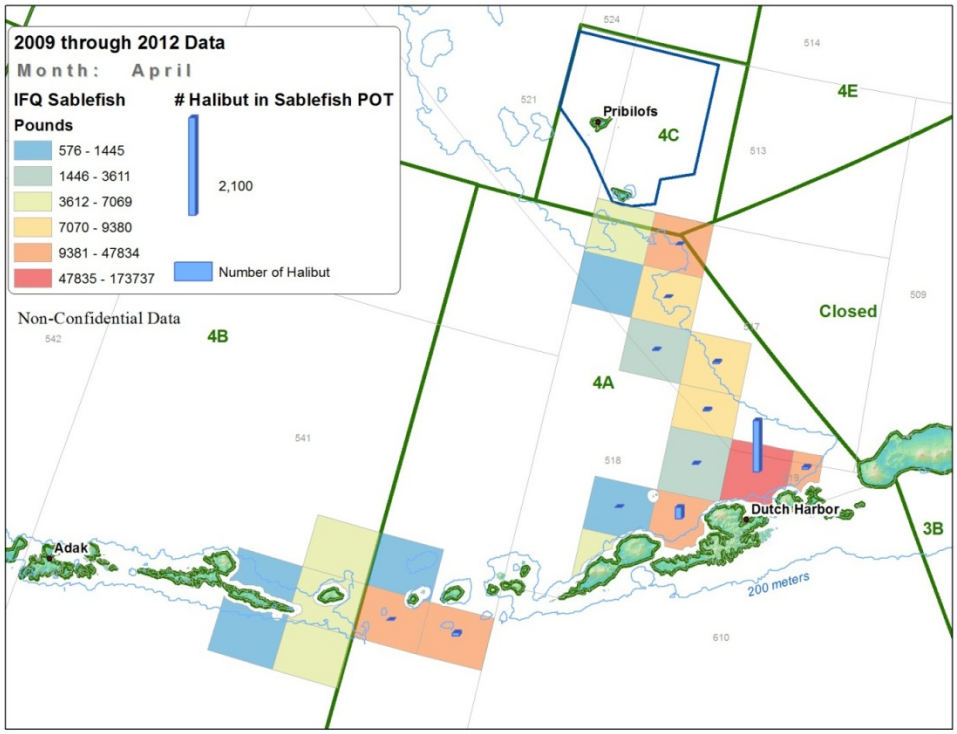


Figure 39 Number of total halibut (summed over 2009-2012) caught incidentally in IFQ sablefish fishery in pot gear by month.

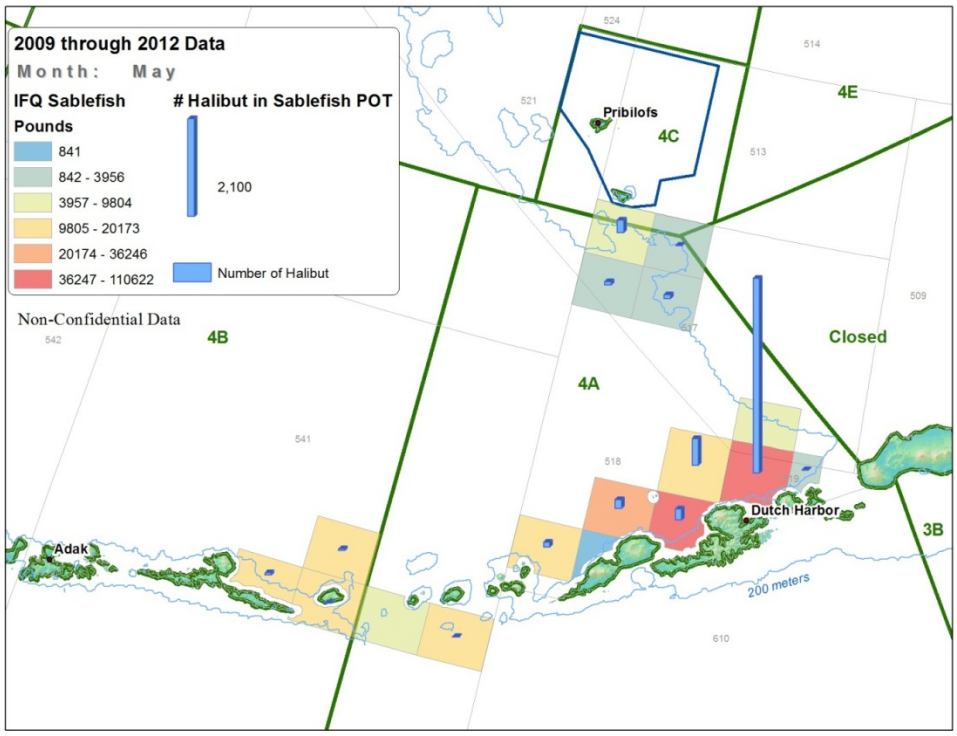


Figure 40 Number of total halibut (summed over 2009-2012) caught incidentally in IFQ sablefish fishery in pot gear by month.

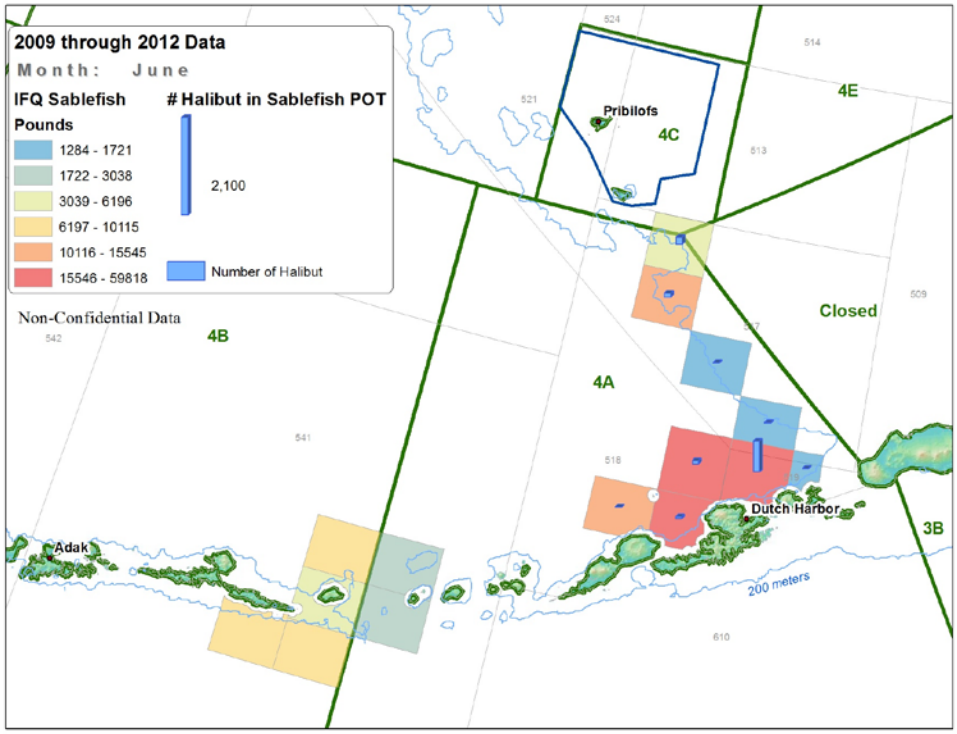


Figure 41 Number of total halibut (summed over 2009-2012) caught incidentally in IFQ sablefish fishery in pot gear by month.

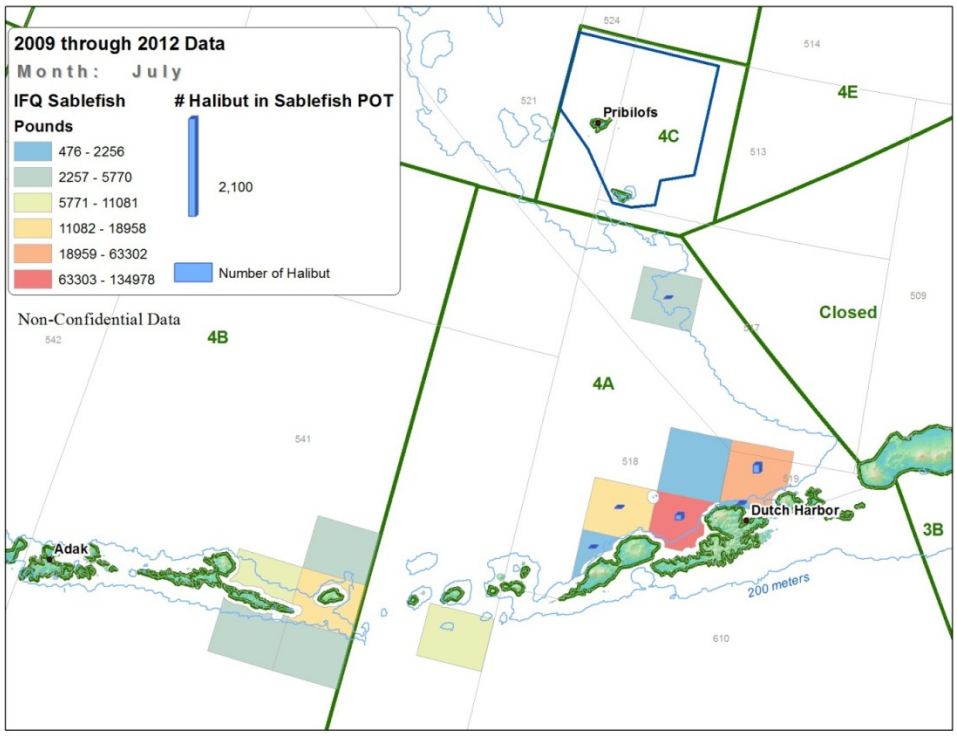


Figure 42 Number of total halibut (summed over 2009-2012) caught incidentally in IFQ sablefish fishery in pot gear by month.

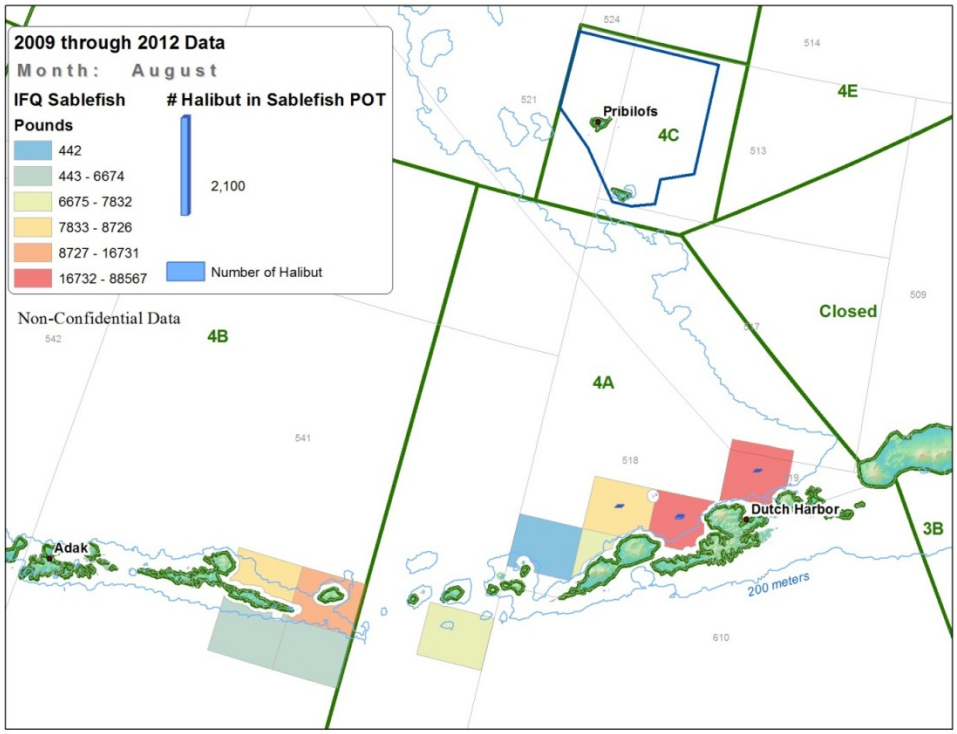


Figure 43 Number of total halibut (summed over 2009-2012) caught incidentally in IFQ sablefish fishery in pot gear by month.

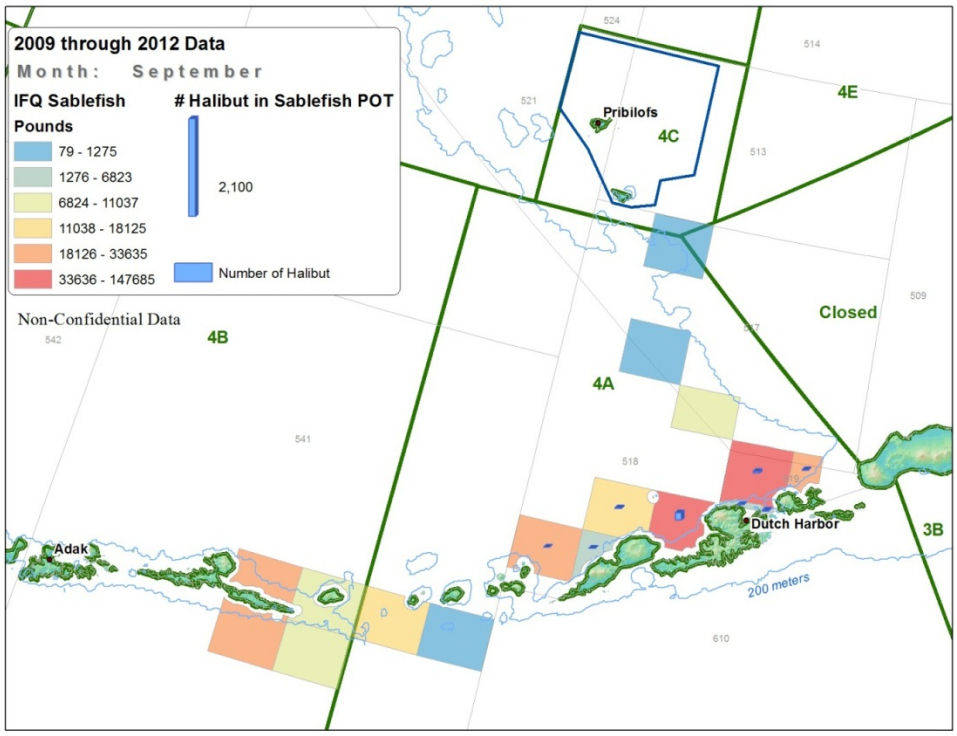


Figure 44 Number of total halibut (summed over 2009-2012) caught incidentally in IFQ sablefish fishery in pot gear by month.

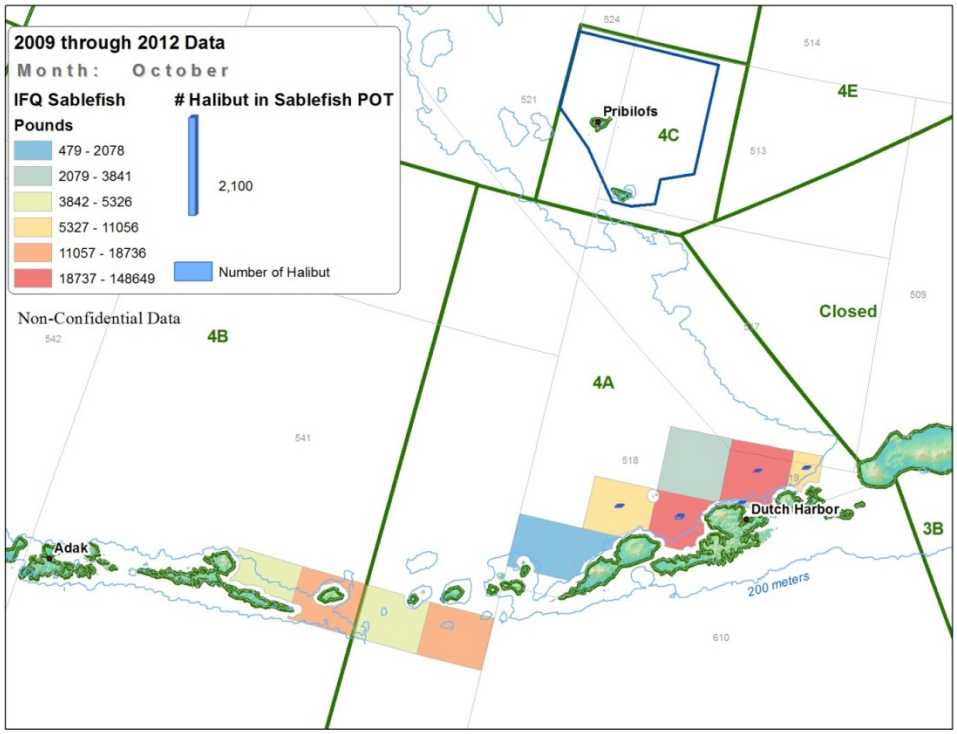
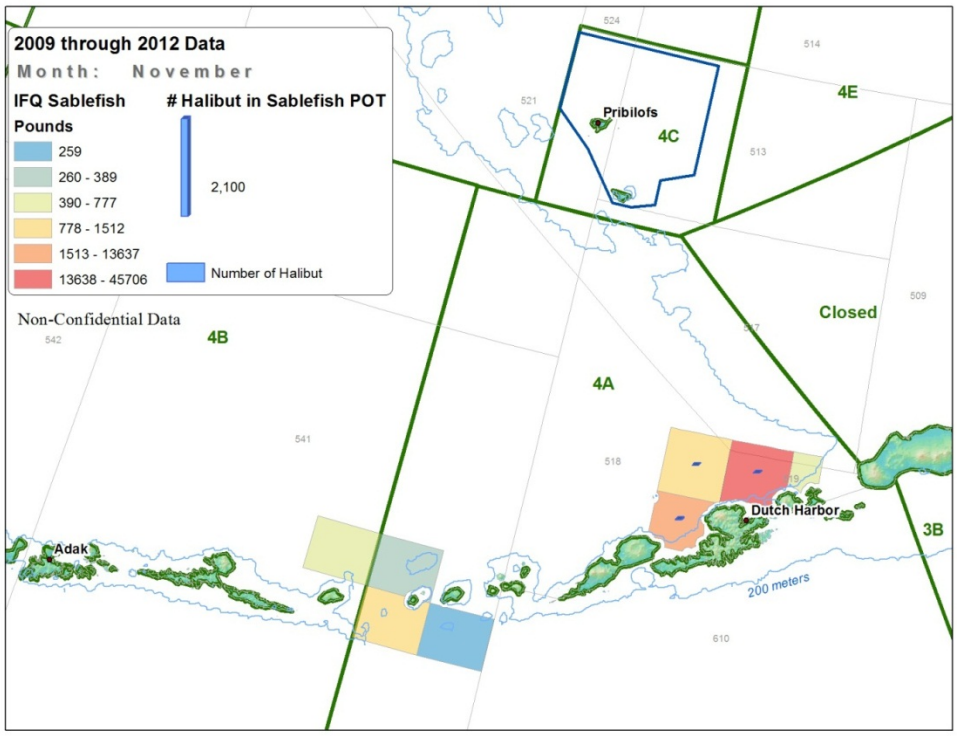


Figure 45 Number of total halibut (summed over 2009-2012) caught incidentally in IFQ sablefish fishery in pot gear by month.



Appendix 2. Background on Automatic Identification System (AIS)

Prior to final action, the Council's range of considered alternatives specifically referenced Automatic Identification System (AIS) technology under the gear specification element (Alternative 2, Element 3). That element would have required both end buoys of a sablefish pot longline set to be marked with a transponder that is detectable by an AIS receiver (or an equivalent system). The purpose of this specification was to make it easier for both pot and non-pot vessel operators to detect the location of a pot longline string and avoid gear conflict. AIS is currently used for different purposes in a variety of formats. However, AIS is not currently used to mark fishing gear, and no regulations speak to what type of AIS application would be required for such a use. This appendix provides a general overview of how AIS is currently used, where it is required, and how existing technology might reasonably be adapted for fishery management. Cost information is included at the extent to which it is available. Because the Council chose not to specify the use of a particular technology (AIS), this information was moved from the RIR to this appendix. It is maintained in the document because it was part of the body of information that was available to the Council and the public during the development of the preferred alternative.

AIS Categories and Regulations

Shipboard AIS was originally intended as a vessel collision avoidance system that acts like a transceiver and operates in the VHF maritime band. AIS is used to identify and locate vessels by electronically exchanging data with other nearby ships and shore-based AIS stations. AIS transponders automatically broadcast information at regular intervals via a built-in VHF transmitter. Title 33 in the Code of Federal regulations (§164.46) defines AIS as a maritime navigation safety communications system that is standardized by the International Telecommunication Union (ITU), is adopted by the International Maritime Organization (IMO), and that provides vessel information to appropriately equipped shore stations, other ships, and aircraft. Vessel information includes identity, type, position, course, speed, navigational status, and other safety-related information. Certain AIS units can receive such information from similarly fitted ships, or Aids to Navigation (ATON) that are fitted with AIS.

AIS units for ships come in two types, Class A and Class B. According to 33 CFR §164.46(b), commercial self-propelled fishing vessels of 65 feet or more in length are subject to AIS carriage requirements. Class A units report more frequently, and receive precedence over Class B on the transmission band when many units are attempting to transmit over the VHF channel at the same time and location. AIS A units transmit at a higher wattage than AIS B units (12W versus 2W), are capable of handling over 4,500 reports per minute, and update as often as every two seconds[63]. Class A units are required for vessels that are over a certain gross tonnage, length, or are engaged in commercial service with more than 150 passengers. Fishing vessels are exempt from these carriage requirements. AIS A units provide unfiltered real-time data that may only be shared with U.S. or foreign government agencies for legitimate internal government use.

Class B units were developed as a new generation of low-cost AIS transceivers, and do not have to meet all of the IMO performance standards of AIS A. AIS B units transmit less frequently and report only on the vessel's static data and location, but not voyage-related information. AIS B units can receive safety-related text messages, but cannot transmit them. AIS B units are permitted on fishing vessels, but not required[64]. AIS B units provide filtered real-time data that may be shared with the four following types of entities: (1) foreign governments, or U.S. federal, state, local, and tribal government agencies; (2) non-

[63] AIS A units transmit less frequently when moored (as detected by a lack of physical movement), so as not to overcrowd the bandwidth in harbors and other high-density ship areas.

[64] In 2008, the USCG submitted a proposed rule that would expand the applicability of AIS requirements to additional commercial vessels. The rule is still awaiting approval. Regulatory language can be found at: http://www.regulations.gov/#!documentDetail;D=USCG-2005-21869-0001.

governmental entities that are contractually supporting a Federal government agency's operations or research and development efforts (with proper documentation); (3) USCG-validated port partners (with proper documentation); and (4) non-governmental entities with which the U.S. has an established or formalized relationship.

The USCG's Frequently Asked Questions page notes that AIS and VMS are not inter-operable or compatible; each uses different communication systems, protocols, reporting rates. AIS is primarily intended to mitigate the risk of vessel collision and to enhance situational awareness; VMS is not a substitute for AIS in this sense.

AIS is also used to help vessels identify USCG Aids to Navigation. ATON units are generally found on buoys, are highly configurable, and their transmissions can be picked up by any AIS-enabled receiver. ATON units can be programmed to transmit specific messages. ATON units typically transmit every three minutes. They are listed on the USCG Light List, and any AIS ATON station must receive prior approval from the Coast Guard before the Federal Communications Commission (FCC) or the National Telecommunication Information Agency (NTIA) will grant authorization. The main constraint to ATONs is power consumption, as they tend to be situated at sea. Some ATON units employ solar panels to power the buoy's functions. An ATON unit could be programmed to transmit less often, but would still need to power up to search for available time slot in the AIS frequency. ATON units can send and receive messages, but would only need to transmit location and vessel identification information to serve the Council's intended purpose. Physically, ATON units are approximately 4" by 5" by 6" and weigh between 2 and 3 pounds, not counting any additional power system.

AIS receivers are a cost effective tool for seeing other vessels within your range, but they do not broadcast a signal from their own vessel. Similar to AIS transceivers, receivers are easily connected to chart plotters, radar, and other computer displays. Receive-only units do not have standard specifications, because they would not pose a threat to the integrity of the international AIS system.

In regards to cost, AIS A units are the most expensive; they are generally price in the $2,000 to $3,000 range. AIS B units appear on the market in the $400 to $1,400 range. AIS receivers are available in the $200 to $400 range.

A number of national authorities outside the U.S. have permitted the development of hybrid AIS devices, despite there being published specifications for AIS[65]. A hybrid device would be one that maintains the transmission integrity and reliability of other AIS units, but adds or deletes other features to suit an intended purpose. "Identifier" AIS transceivers have been developed to use core AIS B technology that transmits in compliance with IMO specifications, but is designed for enhanced battery life, low cost, and ease of installation. These devices would not be IMO-certified, but managing authorities have made their own technical evaluations to ensure that the operation of the device does not harm the international AIS system. The FCC grants one of the recognized and accepted certifications for an unspecified AIS product. FCC certification would likely require independent performance verification by a qualified independent testing agency.

Each AIS transponder must have a unique marine mobile service identity (MMSI) that identifies the unit's transmissions with a certain vessel, ATON, shore-based station, or other source. MMSIs are managed internationally by the ITU, and each nation is allocated a limited amount for distribution. The Coast Guard might need to develop a policy for the issuance of limited MMSIs. Non-Federal AIS users in the U.S. must obtain an MMSI by applying to the FCC for a license. The USCG's Navigation Center

[65] This statement is made according to a 2012 white paper on maritime safety by the Asian Development Bank, available at: http://www.adb.org/sites/default/files/linked-documents/44375-013-png-oth-02.pdf.

website (NAVCEN[66]) implies that individuals might incur some cost in obtaining an MMSI, stating that "[only] state and local governments can generally obtain an FCC ship station license at no charge."

Access to AIS Data

As noted above, restrictions are placed on the types of entities with which AIS information can be shared. The USCG has developed a Nationwide Automatic Identification System (NAIS) that consists of approximately 200 receiver sites located throughout the coastal U.S., inland rivers, Alaska, Hawaii, and Guam. These shore-based receivers are often operated by non-governmental organizations, such as Marine Exchange of Alaska (MXAK). NAIS collects maritime data in 58 critical ports for use by USCG and port partners. The goal of NAIS is to increase navigational safety, enable search and rescue operations, and enhance environmental protection services. NAIS consolidates data from shore-based receiver stations, whereas core AIS is a ship-to-ship collision avoidance system. Real-time NAIS feeds can only be shared through an approved Interconnection Security Agreement (ISA) with the Coast Guard.

Some government agencies receive AIS data and make it usable for natural resource stakeholders. Marine Cadastre (MC) is a partnership between the Bureau of Ocean Energy Management and NOAA's Office of Coastal Management. MC is positioned to receive and process AIS data to assist offshore energy and marine planners. MC works with hundreds of AIS users to create mapping and geographic data products, and lists fishery stakeholders among their constituents. Unlike MXAK and other primary AIS data collectors, MC receives data on an annual basis, and thus would be less well positioned to assist stakeholders looking to track the dynamic movement of gear on fishing grounds.

Groups like MXAK are authorized to collect AIS data and provide it to USCG and individuals who subscribe to an annual membership. MXAK is a non-profit organization established in 2000 that provides communication and information services to ensure safe maritime operation. MXAK operates roughly 120 shore-based AIS receiving stations in Alaska, located from Southeast to the Aleutians to the Pribilofs and the Arctic (see Figure 45). MXAK lists its current membership on its website[67]; members include many Alaska seafood processors, commercial vessel groups, and municipal port authorities. MXAK also partners with satellite monitoring providers, which expands coverage for their members to over 100 miles offshore. One such satellite provider is exactEarth. exactEarth's reports that its constellation of low earth orbit satellites has strong coverage around the 55 degree North latitude, which would cover buoy-based AIS in the GOA. AIS-receiving satellites would fly over the fishing grounds approximately every 40 minutes and cache the data until they are within line-of-sight to a land station. Due to the need to transmit data to the ground, satellite information might be time lagged, but likely not for more than several hours. A MXAK membership costs $500 per year per log-in, and access to satellite data costs an additional $500 per year. exactEarth also sells access to its data, though it would probably refer someone interested only in Alaska coverage to MXAK. exactEarth memberships can provide global satellite coverage; their direct membership fee is somewhat higher (around $2,000 per user per year, and less per user if a large number of log-ins are requested). A subscription to an AIS data provider enables access to all near real-time maps and their underlying data from anywhere with an internet connection. It should be noted, however, that a vessel carrying an AIS receiver could pick up the data on its plotter without a subscription, so long as it's within radio frequency range with the transmitting unit – be it a ship or a buoy.

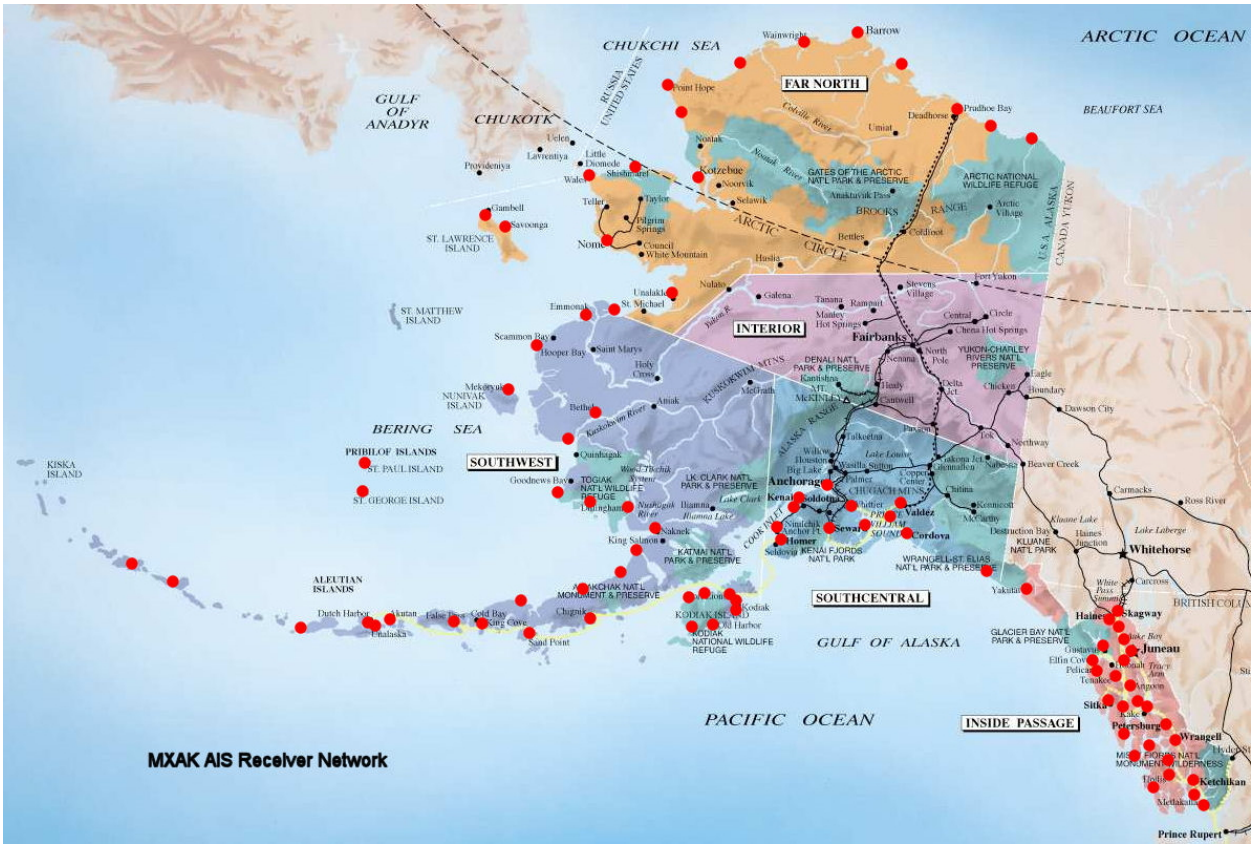
Marking fishing buoys with an AIS unit is not a typical application of this technology, and would likely require some customization. If the Council or fishermen were concerned about providing the location of their gear to any other AIS user, it would likely have been possible to program each buoy transponder to mask the associated vessel's identification. In that case, a subscriber who logs in from onshore would see that gear is set in a certain location, but would not know to whom it belonged. Buoys would still be

[66] http://navcen.uscg.gov
[67] http://www.mxak.org

marked with a vessel's identification that is visible to any other vessel physically present on the fishing grounds, but that is already a requirement under the status quo.

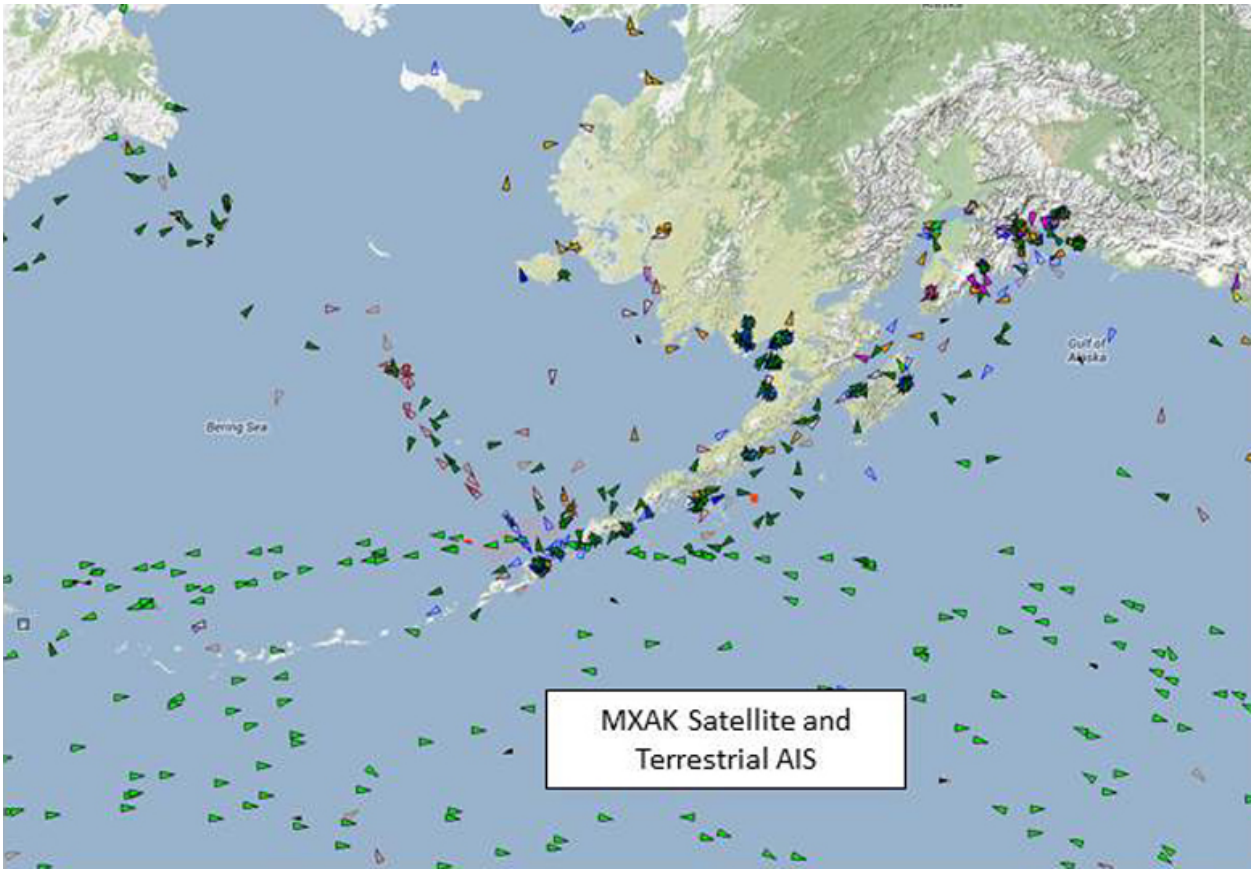
Figure 46 and Figure 47 provide examples of what a subscribing member could see through MXAK or exactEarth's portals. Figure 47 shows a screen grab of AIS A data, where one vessel is highlighted to display vessel and voyage-related information.

Figure 46 Map of shore-based AIS receiving stations operated by Marine Exchange of Alaska



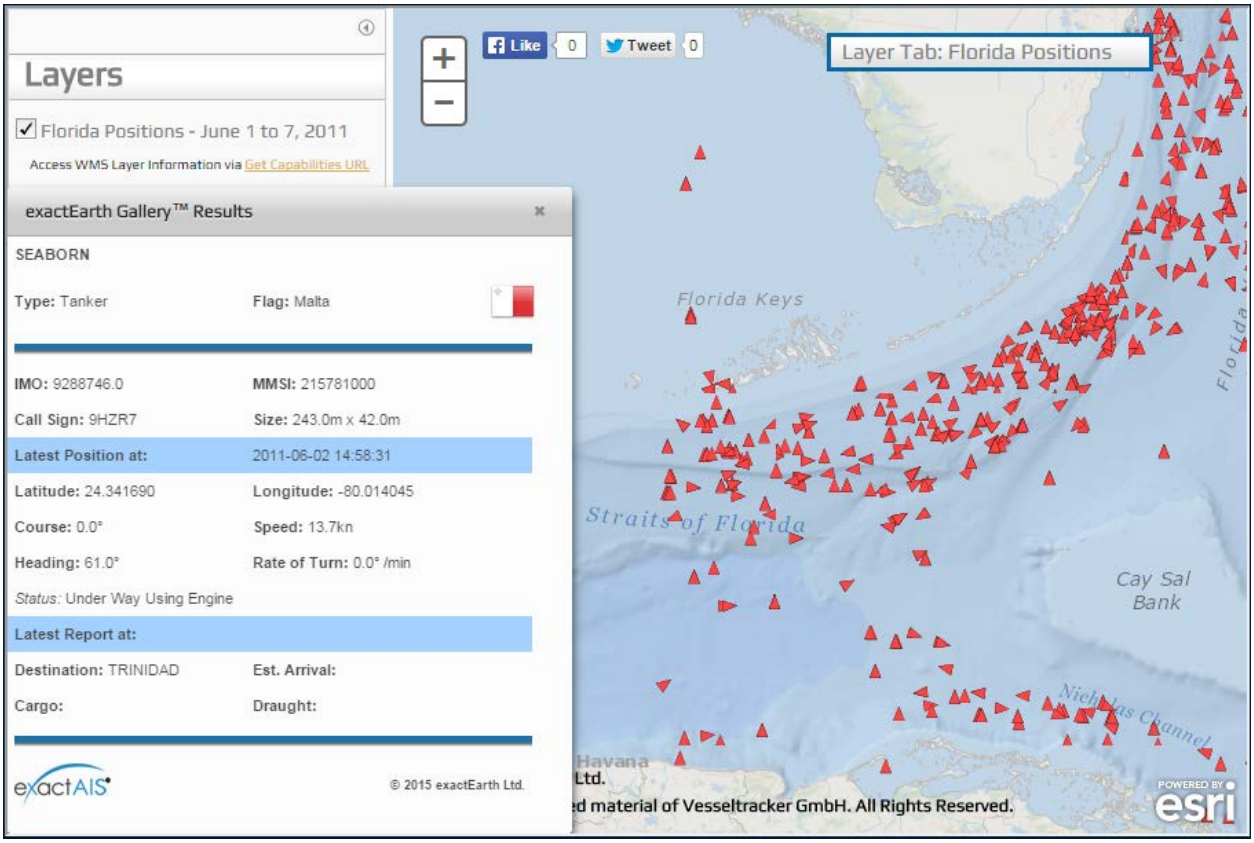
Source: www.mxak.org/home/home_images/ais03515.jpg

Figure 47 Example of Marine Exchange of Alaska's PacTracs 2.0 display for a member user who subscribes to both shore-based and satellite tracked AIS monitoring



Source: www.mxak.org/vtrack/display.html

Figure 48 Example screen capture of vessel activity tracked by the AIS satellite data provider, exactEarth (Example is tracking AIS-A transceiver information)



Source: Gallery image from exactEarth website, www.gallery.exactearth.com (accessed March 4, 2015).

AIS Capabilities and Limitations

An AIS receiver's coverage range depends on the height of the receiving antenna, similar to a VHF application. Signal propagation is slightly better than that of radar due to a longer wavelength, so it's possible for AIS receivers to "see" around bends or behind land masses that are not too high. A typical range of detection at sea is approximately 20 nautical miles, depending on conditions. An AIS transponder situated on a buoy at water-level would not have as great a line-of-sight range as would a unit located on top of a vessel. Buoy-type AIS units, should, however, be readily visible to any AIS-receiving satellites that are passing over the buoy's location.

Battery life and durability at sea are likely the key limitations for an AIS transponder placed on a buoy. The transmitting technology clearly exists, and the MMSI registration limits are not likely to be a constraint unless the amount of AIS-enabled pot longline buoys numbers in the many thousands. If the Council did not intend for gear buoys to be visible through the AIS network at all times to users onshore, it would not have been necessary to ensure full coverage of the GOA sablefish fishing area from AIS shore base stations. Solar power units may not be a viable solution for buoy-based AIS, given that tides often pull buoys under water, and that the North Pacific region receives limited sunlight at certain times of year. Technology developers may be called upon to develop units with replaceable batteries, as opposed to the power systems that have to be shipped off for refurbishment, like the ones on EPIRBs. Even if AIS buoy units are sealed in water-tight containers, fishermen might consider placing the unit on a "trailing buoy" attached to the anchor buoy; the trailing buoy would be less likely to submerge under a strong tide.

Appendix 3. Regulatory Definitions and Requirements Informing This Action

§679.2 Definitions.

Authorized fishing gear (see also §679.24 for gear limitations and Table 15 to this part for gear codes) means trawl gear, fixed gear, longline gear, pot gear, and nontrawl gear as follows: (7) *Hook-and-line gear* means a stationary, buoyed, and anchored line with hooks attached, or the taking of fish by means of such a device.

(4) *Fixed gear* means:

(i) For sablefish harvested from any GOA reporting area, all longline gear and, for purposes of determining initial IFQ allocation, all pot gear used to make a legal landing.

(ii) For sablefish harvested from any BSAI reporting area, all hook-and-line gear and all pot gear.

(iii) For halibut harvested from any IFQ regulatory area, all fishing gear comprised of lines with hooks attached, including one or more stationary, buoyed, and anchored lines with hooks attached.

(7) *Hook-and-line gear* means a stationary, buoyed, and anchored line with hooks attached, or the taking of fish by means of such a device.

(9) *Longline gear* means hook-and-line, jig, troll, and handline or the taking of fish by means of such a device.

(10) *Longline pot* means a stationary, buoyed, and anchored line with two or more pots attached, or the taking of fish by means of such a device.

(15) *Pot gear* means a portable structure designed and constructed to capture and retain fish alive in the water. This gear type includes longline pot and pot-and-line gear. Each groundfish pot must comply with the following:

(i) *Biodegradable panel.* Each pot used to fish for groundfish 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 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).

(16) *Pot-and-line gear* means a stationary, buoyed line with a single pot attached, or the taking of fish by means of such a device.

Fishing trip means: (1) With respect to retention requirements (MRA, IR/IU, and pollock roe stripping), recordkeeping and reporting requirements under §679.5, and determination of directed fishing for flatfish.

(i) *Catcher/processors and motherships.* An operator of a catcher/processor or mothership processor vessel is engaged in a fishing trip from the time the harvesting, receiving, or processing of groundfish is begun or resumed in an area until any of the following events occur:

(A) The effective date of a notification prohibiting directed fishing in the same area under §679.20 or §679.21;

(B) The offload or transfer of all fish or fish product from that vessel;

(C) The vessel enters or leaves an area where a different directed fishing prohibition applies;

(D) The vessel begins fishing with a different type of authorized fishing gear; or

(E) The end of a weekly reporting period, whichever comes first.

(ii) *Catcher vessels.* An operator of a catcher vessel is engaged in a fishing trip from the time the harvesting of groundfish is begun until the offload or transfer of all fish or fish product from that vessel.

(2) *IFQ Program.* With respect to the IFQ Program, the period beginning when a vessel operator commences harvesting IFQ species and ending when the vessel operator lands any species.

(3) *Groundfish and Halibut Observer Program.* With respect to subpart E of this part, one of the following periods:

(i) For a catcher vessel delivering to a shoreside processor or stationary floating processor, the period of time that begins when a catcher vessel departs a port to harvest fish until the offload or transfer of all fish from that vessel.

(ii) For a catcher vessel delivering to a tender vessel, the period of time that begins when a catcher vessel departs from port to harvest fish until the vessel returns to a port in which a shoreside processor or stationary floating processor with a valid FPP is located.

Fishing trip means:

(2) *IFQ Program.* With respect to the IFQ Program, the period beginning when a vessel operator commences harvesting IFQ species and ending when the vessel operator lands any species.

Gear deployment (or to set gear) (see §679.5(c)(3)(vi)(B) for longline and pot gear; see §679.5(c)(4)(vi)(B) for trawl gear).

Gear retrieval (or to haul gear) (see §679.5(c)(3)(vi)(C) for longline and pot gear; see §679.5(c)(4)(vi)(C) for trawl gear).

Set means a string of longline gear, a string of pots, or a group of pots with individual pots deployed and retrieved in the water in a similar location with similar soak time. In the case of pot gear, when the pots in a string are hauled more than once in the same position, a new set is created each time the string is retrieved and re-deployed. A set includes a test set, unsuccessful harvest, or when gear is not working and is pulled in, even if no fish are harvested.

§679.5 Recordkeeping and reporting (R&R).

(c) *Logbooks*—

(3) *Longline and pot gear catcher vessel DFL and catcher/processor DCPL*—

(vi) *Catch-by-set information.* The operator must record the following information (see paragraphs (c)(3)(vi)(A) through (L) of this section) for each set (see §679.2) in the DFL or DCPL. If no catch occurred for a given day, write "no catch."

(B) *Gear deployment (or to set gear)*—

(*3*) *Pot gear begin position.* Record date (mm/dd), time (in military format, A.l.t.), and the begin position (latitude and longitude to the nearest minute; indicate E or W for longitude) when the pot gear enters the water.

(C) *Gear retrieval (or to haul gear)*—

(*3*) *Pot gear end position.* Date (mm/dd), time (in military format, A.l.t.), and end position coordinates (in latitude and longitude to the nearest minute; indicate E or W for longitude) where the last pot of a set is retrieved, regardless of where the majority of the set took place.

Appendix 4. Maps and Additional Methodology for Community Engagement and Reliance Indices

The following information is provided by Alaska Fisheries Science Center (Kasperski and Himes-Cornell, 2014). This information pertains to the background section on communities involved in the GOA sablefish IFQ fishery (Section 4.5.7).

Table 45 Fisheries involvement indices with factor loadings and total variance explained

Commercial Processing Engagement	Rotated Factor Loading	Total Variance Explained
Commercial pounds landed in the community	0.980	87%
Commercial revenue landed in the community	0.976	
Number of delivering vessels	0.986	
Number of delivering individuals	0.975	
Number of registered buyers	0.707	
Commercial Processing Reliance		
Commercial pounds landed in the community per capita	0.963	90%
Commercial revenue landed in the community per capita	0.955	
Number of delivering vessels per capita	0.994	
Number of delivering individuals per capita	0.980	
Number of registered buyers per capita	0.849	
Commercial Harvesting Engagement		
Quota share held by residents	0.940	84%
Number of quota share holders	0.944	
Number of vessels owned by residents	0.963	
Number of delivering residents	0.960	
Commercial landings by vessels owned by residents	0.964	
Commercial revenue from vessels owned by residents	0.962	
Commercial Harvesting Reliance		
Quota share held by residents per capita	0.912	91%
Number of quota share holders per capita	0.708	
Number of vessels owned by residents per capita	0.959	
Number of delivering residents per capita	0.950	
Commercial landings by vessels owned by residents per capita	0.962	
Commercial revenue from vessels owned by residents per capita	0.966	

Figure 49 Distribution of commercial GOA sablefish IFQ processing engagement for 62 Alaska communities. All communities that are considered “high engagement” are labeled in red, with the exception of Bellingham, WA, which also ranks as highly engaged but is not shown on the figure.

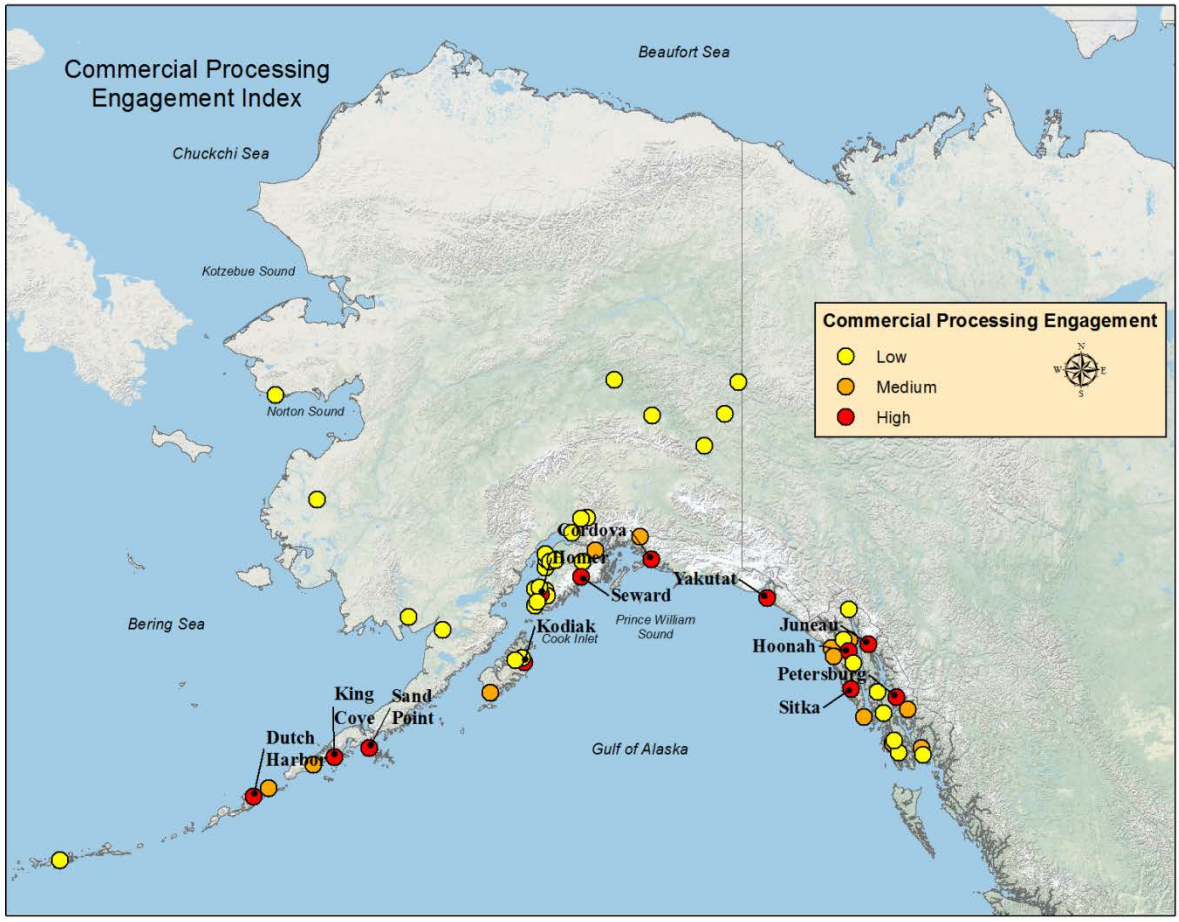


Figure 50 Distribution of commercial GOA sablefish IFQ processing reliance for 62 Alaska communities. All communities that are considered “high reliance” are labeled in red

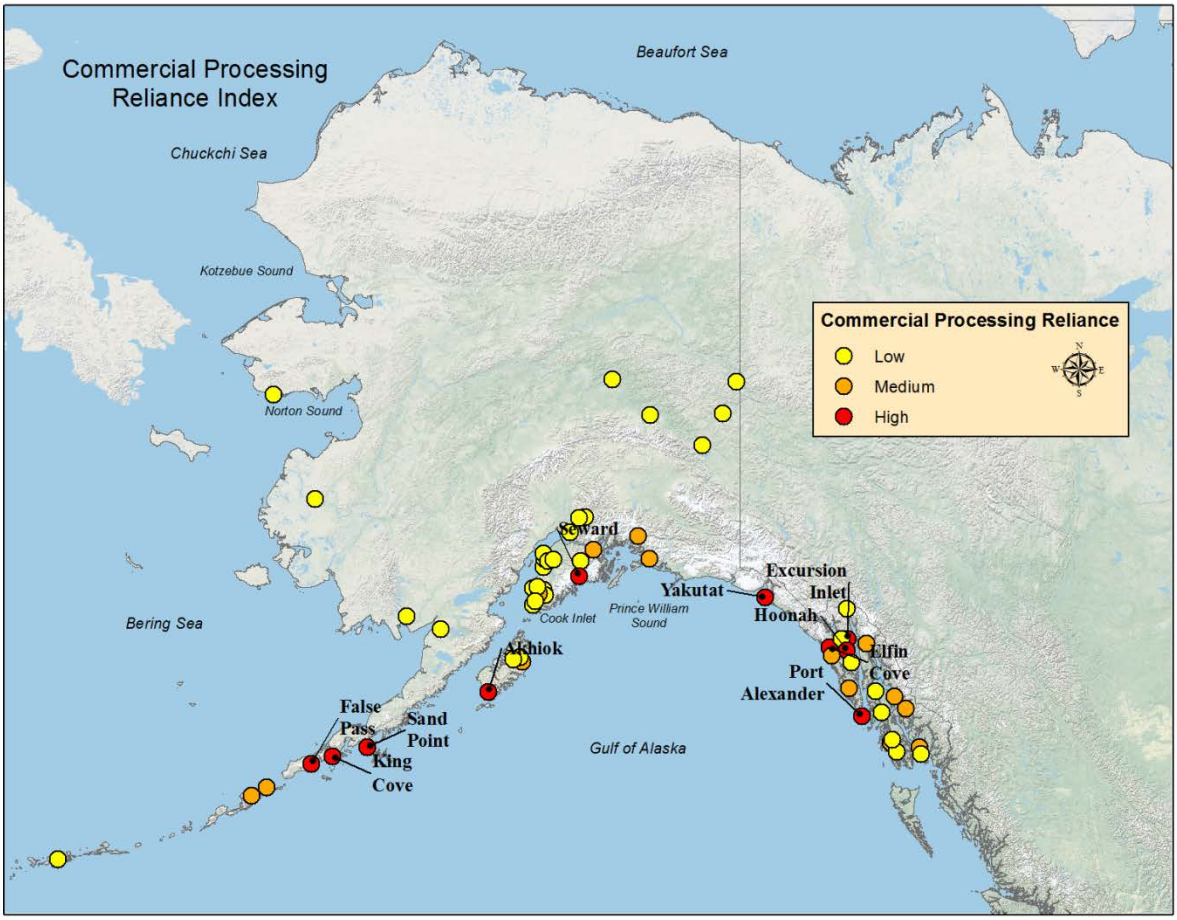


Figure 51 Distribution of commercial GOA sablefish IFQ harvesting engagement for 62 Alaska communities. All communities that are considered “high engagement” are labeled in red, with the exception of Seattle, WA, which also ranks as “high engagement” but is not shown on the figure.

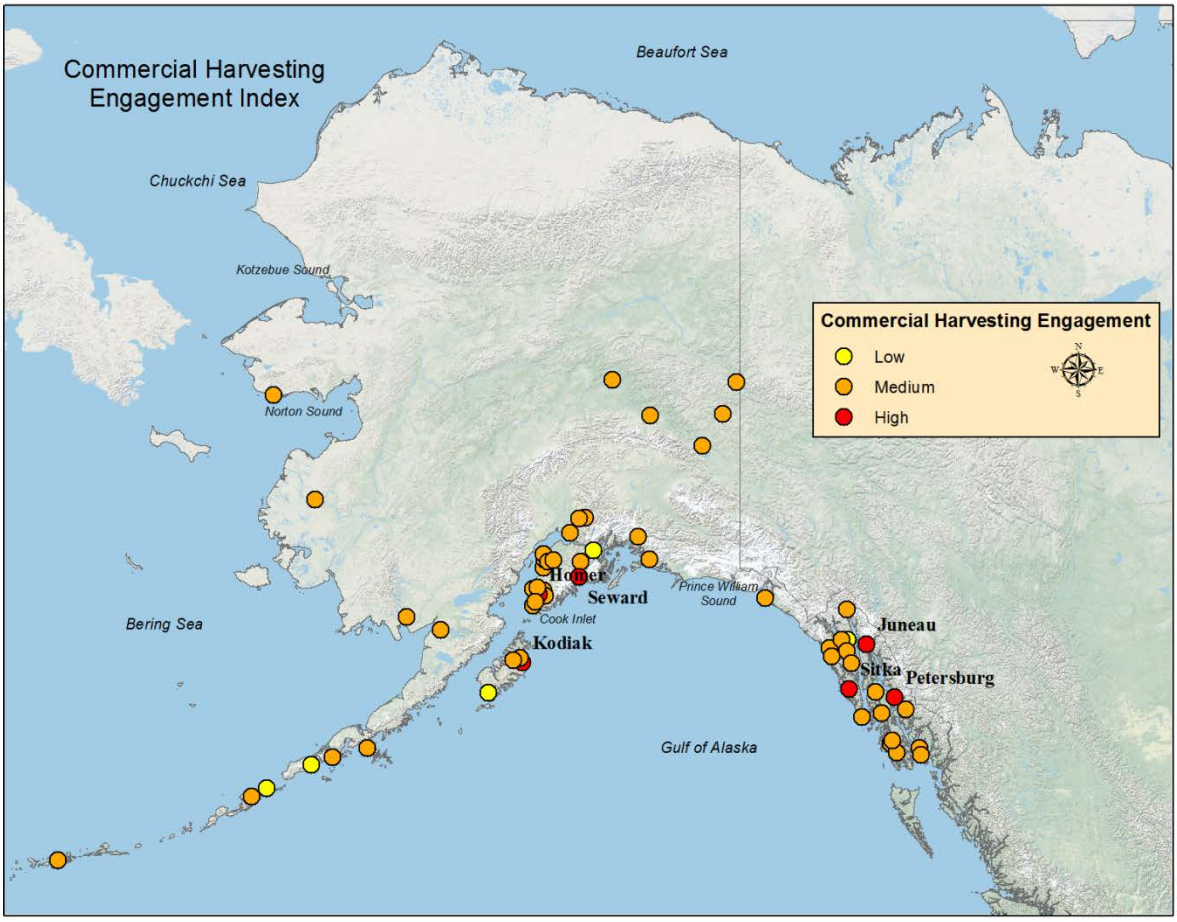
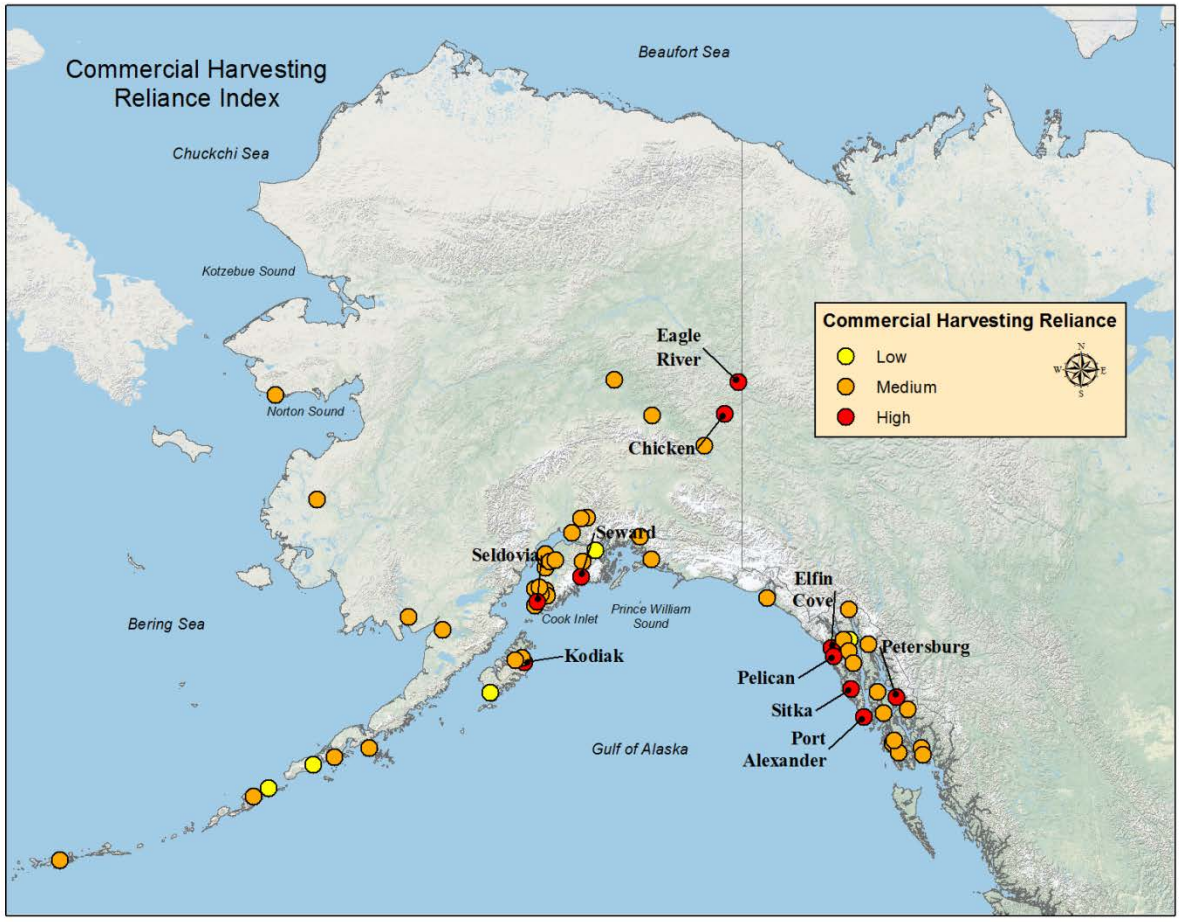


Figure 52 Distribution of commercial GOA sablefish IFQ harvesting reliance for 62 Alaska communities. All communities that are considered “high reliance” are labeled in red, with the exception of Addy, WA, which also ranks as “highly reliant” but is not shown on the figure.



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