PUBLIC REVIEW DRAFT

Environmental Assessment/ Regulatory Impact Review/
Initial Regulatory Flexibility Analysis
for a Proposed Amendment
to the Fishery Management Plan for Groundfish of the
Bering Sea/Aleutian Islands Management Area

Revise
Bering Sea/Aleutian Islands Halibut Prohibited Species Catch Limits

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Abstract: This document analyzes proposed management measures to reduce Pacific halibut prohibited species catch (PSC) mortality limits in the Bering Sea/Aleutian Islands (BSAI) groundfish fisheries. PSC limit reductions are considered for various sectors, including the BSAI trawl limited access sector, the Amendment 80 sector, longline catcher vessels, longline catcher processors, and the Community Development Quota sector (i.e., a reduction to the CDQ's allocated prohibited species quota reserve). The objective of reducing PSC limits would be to minimize bycatch to the extent practicable and provide additional harvest opportunities in the directed halibut fishery.

Executive Summary

This document analyzes proposed management measures to reduce Pacific halibut prohibited species catch (PSC) mortality limits in the Bering Sea/Aleutian Islands (BSAI) groundfish fisheries. PSC limit reductions are considered for various sectors, including the BSAI trawl limited access sector, the Amendment 80 sector, longline catcher vessels, longline catcher processors, and the Community Development Quota (CDQ) sector (i.e., a reduction to the CDQ's allocated prohibited species quota reserve). The objective of reducing PSC limits would be to minimize bycatch to the extent practicable and provide additional harvest opportunities in the directed halibut fishery.

Bycatch and PSC terminology

The Council manages the groundfish fisheries of the BSAI under the authority of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1802(2)), and through a Fishery Management Plan for the Groundfish of the BSAI Management Area (BSAI FMP). Bycatch, as defined by the MSA, "means fish which are harvested in a fishery, but which are not sold or kept for personal use, and includes economic discards[1] and regulatory discards." The term "regulatory discards" means "fish harvested in a fishery which fishermen are required by regulation to discard whenever caught, or are required by regulation to retain, but not sell." In the case of the BSAI FMP, the Council has designated Pacific halibut, along with several other fully utilized species such as salmon, herring, and crab species, as "prohibited species" in the groundfish fisheries, which fishermen are required by regulation to discard. These species are identified in the FMPs; their capture is required to be minimized; and their retention is prohibited. Unintended removals of prohibited species are separately monitored and controlled under the groundfish fishery management plans. In the context of the BSAI FMP, "halibut PSC" refers to the bycatch of halibut in the groundfish fisheries. This analysis primarily addresses halibut PSC mortality, i.e., the subset of halibut PSC that is assumed to be dead as a consequence of interactions with the groundfish fisheries. Mortality calculations are made for all halibut PSC in the groundfish fisheries, using discard mortality rates adopted triennially by the Council as part of the harvest specifications process. Halibut PSC limits, and removals of halibut PSC in the groundfish fisheries, are specified in terms of metric tons, round weight, of halibut PSC mortality.

The International Pacific Halibut Commission (IPHC) is responsible for the overall biologic assessment and conservation of Pacific halibut off the coasts of Alaska, British Columbia, and the western United States. In the parlance of the IPHC, "bycatch" refers to the mortality of Pacific halibut occurring in commercial fisheries that target other species, including halibut PSC mortality in the groundfish fisheries. This analysis refers to halibut PSC mortality in the context of the proposed action, except where appropriate to describe the IPHC catch limit process, or their research or stock assessment information. The IPHC manages and reports on halibut removals in pounds, net weight, of halibut mortality, and assumes that net weights are 75 percent of round weights.

Purpose and Need

Consistent with the MSA's National Standard 1 and National Standard 9, the Council and NMFS use halibut PSC mortality limits to minimize halibut bycatch (halibut PSC) in the groundfish fisheries to the extent practicable, while achieving, on a continuing basis, the optimum yield from the groundfish fisheries. The groundfish fisheries cannot be prosecuted without some level of halibut interception. Although fishermen are required by regulation to avoid the capture of any prohibited species in groundfish fisheries, the use of halibut PSC limits in the groundfish fisheries provides an additional constraint on halibut PSC mortality, and promotes conservation of the halibut resource. Halibut PSC limits provide a regulated upper limit to

[1] "Economic discards" are defined as "fish which are the target of a fishery, but which are not retained because of an undesirable size, sex, or quality, or other economic reason."

mortality resulting from halibut interceptions, as continued groundfish fishing is prohibited once a halibut PSC limit has been reached for a particular sector and/or season. This management tool is intended to balance the optimum benefit to fishermen, communities, and U.S. consumers which depend on both halibut and groundfish resources.

The halibut resource is fully allocated. The IPHC accounts for incidental halibut removals in the groundfish fisheries, recreational and subsistence catches, and other sources of halibut mortality before setting commercial halibut catch limits each year. Declines in the exploitable biomass of halibut since the late 1990s, and decreases in the Pacific halibut catch limits set by the IPHC for the directed BSAI halibut fisheries (IPHC Area 4)), especially beginning in 2012 for the directed fishery in the northern and eastern Bering Sea (Area 4CDE), have raised concerns about the levels of halibut PSC mortality by the commercial groundfish trawl and hook-and-line sectors. Reductions in BSAI halibut PSC mortality have not been proportional to the reductions in Area 4 directed halibut harvest limits since 2011. The Council acknowledges that BSAI halibut PSC mortality levels have declined in some sectors since the current PSC limits were implemented and that PSC mortality does not reach the established sector limits in most years. The Council also recognizes efforts by the groundfish industry to reduce total halibut PSC mortality in the BSAI, but these efforts have had the unintended effect of concentrating groundfish fishing effort in Area 4CDE, and increasing the proportion of Area 4CDE halibut exploitable biomass taken as PSC since 2011. In 2015, the levels of halibut PSC in Area 4CDE increased relative to 2014. Based on the stated IPHC harvest policy and the estimates of exploitable biomass and PSC, the 2015 directed fishery harvest limit for halibut in Area 4CDE could have been reduced to a level that the halibut industry deemed was not sufficient to maintain an economically viable fishery in some communities.

The Council does not have authority to set harvest limits for the commercial halibut fisheries, and halibut PSC mortality in the groundfish fisheries is only one of the factors that affects harvest limits for the commercial halibut fisheries. Nonetheless, halibut removals in the groundfish fisheries are a significant portion of total mortality in BSAI IPHC areas, and have the potential to affect harvest limits for the directed fisheries in Area 4 under the current IPHC harvest policy.

Under National Standard 8, the Council must provide for the sustained participation of and minimize adverse economic impacts on fishing communities. BSAI coastal communities are affected by reduced catch limits for the directed halibut fishery, especially in IPHC Area 4CDE. The Council must balance these communities' involvement in and dependence on halibut with community involvement in and dependence on the groundfish fisheries that rely on halibut PSC in order to operate, and with National Standard 4, which states that management measures shall not discriminate between residents of different states. National Standard 4 also requires allocations of fishing privileges to be fair and equitable to all fishery participants.

The proposed action would reduce the halibut PSC limits in the BSAI, which are established for the BSAI trawl and fixed gear sectors in Federal regulation, and in some cases, in the BSAI Groundfish FMP. Overall halibut PSC limits can be modified only through an amendment to the regulations and the FMP, although seasonal and some target fishery apportionments of those PSC limits would continue to be set annually through the BSAI groundfish harvest specifications process.

One purpose of the proposed action is to minimize halibut PSC mortality in the commercial groundfish fisheries to the extent practicable, while preserving the potential for the optimum harvest of the groundfish total allowable catches (TACs) assigned to the trawl and hook-and-line sectors. The proposed action aims to minimize halibut PSC mortality to the extent practicable in consideration of the regulatory and operational management measures currently available to the groundfish fleet, and the need to ensure that catch in the trawl and hook-and-line fisheries contributes to the achievement of optimum yield in the groundfish fisheries. Minimizing halibut PSC mortality to the extent practicable is necessary to maintain a healthy marine ecosystem, ensure long-term conservation and abundance of halibut, provide optimum

benefit to fishermen, communities, and U.S. consumers that depend on both halibut and groundfish resources, and comply with the Magnuson-Stevens Act and other applicable Federal law.

Another purpose of this action is to provide additional harvest opportunities in the directed halibut fishery, especially in Area 4CDE for western Alaska and Pribilof Island coastal communities. Halibut savings that would occur from reducing halibut PSC mortality below current levels would provide additional harvest opportunities to the directed halibut fisheries in both the near term and long term. Near term benefits to BSAI halibut fisheries would result from the PSC mortality reductions of halibut that are over 26 inches in length (O26). These halibut would be available to the commercial halibut fishery in the area and year that the PSC mortality is foregone, or when the fish reach the legal size limit for the commercial halibut fishery (greater than or equal to 32 inches in total length). Longer term benefits to the directed halibut fisheries would accrue throughout the distribution of the halibut stock, from a reduction of halibut PSC mortality from fish that are less than 26 inches (U26). Benefits from reduced mortality of these smaller halibut would occur both in the Bering Sea and elsewhere as they migrate and recruit into the directed halibut fisheries.

Alternatives

The Council revised the original alternatives for analysis at initial review in February 2015; the amended alternatives are listed below. More than one option may be selected simultaneously, and different PSC reductions levels may selected under each option. Table ES-1 (below) identifies the proposed PSC limits under each reduction option, for each sector.

Alternative 1 No action.

Alternative 2 Amend the BSAI Groundfish FMP and Federal regulations to revise halibut PSC limits as follows *(more than one option can be selected)*.

Option 1 Reduce halibut PSC limit for the Amendment 80 Sector by:

Suboption 1 reducing the halibut PSC limit to Amendment 80 cooperatives by:

a) 10 percent b) 20 percent c) 30 percent d) 35 percent e) 40 percent f) 45 percent or g) 50 percent

Suboption 2 reducing the halibut PSC limit to Amendment 80 limited access fishery by:

a) 10 percent b) 20 percent c) 30 percent d) 35 percent e) 40 percent f) 45 percent g) 50 percent or h) 60 percent

Option 2 Reduce halibut PSC limit for the BSAI Trawl Limited Access Sector by:

a) 10 percent b) 20 percent c) 30 percent d) 35 percent e) 40 percent f) 45 percent or g) 50 percent

Option 3 Reduce halibut PSC limit for Pacific cod hook and line catcher processor sector by:

a) 10 percent b) 20 percent c) 30 percent d) 35 percent e) 40 percent f) 45 percent or g) 50 percent

Option 4 Reduce halibut PSC limit for other non-trawl (i.e., hook and line catcher vessels and catcher processors targeting anything except Pacific cod or sablefish) by:

a) 10 percent b) 20 percent c) 30 percent d) 35 percent e) 40 percent f) 45 percent or g) 50 percent

Option 5 Reduce halibut PSC limit for Pacific cod hook and line catcher vessel sector by:

b) 10 percent b) 20 percent c) 30 percent d) 35 percent e) 40 percent f) 45 percent or g) 50 percent

Option 6 Reduce the CDQ halibut PSQ limit by:

a) 10 percent b) 20 percent c) 30 percent d) 35 percent e) 40 percent f) 45 percent or g) 50 percent

Table ES-1 Proposed PSC Limits under Alternative 2 (in mt)

	Status quo	a) -10%	b) -20%	c) -30%	d) -35%	e) -40%	f) -45%	g) -50%	h) -60%
Option 1: Amendment 80*	2,325	2,093	1,860	1,628	1,511	1,395	1,279	1,163	930
Option 2: BS trawl limited access	875	788	700	613	569	525	481	438	
Option 3: Hook and line Pcod – CP	760	684	608	532	494	456	418	380	
Option 4: Hook and line CV and CP – targets other than Pcod or sablefish	58	52	46	41	38	35	32	29	
Option 5: Hook and line Pcod – CV	15	14	12	11	10	9	8	8	
Option 6: CDQ PSQ	393	354	314	275	255	236	216	197	

* Note, the eighth possibility in the range, h) -60%, only applies to Amendment 80 Suboption 2, which allows for a different PSC limit reduction for the Amendment 80 limited access fishery.

Environmental Assessment

Under Alternative 1, there would be no changes to the regulated BSAI PSC limits. Since 2008, halibut PSC mortality in the BSAI groundfish fisheries has been 70 to 84 percent of the regulated PSC limits (Table ES-2). At the Council's request, industry sectors have made voluntary efforts to reduce halibut PSC mortality in the BSAI over the 2014 and 2015 fishing seasons.

Table ES-2 Halibut PSC mortality in BSAI groundfish target fisheries, by sector, 2008 to 2014, in metric tons, and mortality as a percentage of the 2013 halibut PSC limit for each sector

Sector	2013 PSC limit		2008	2009	2010	2011	2012	2013	2014	Average PSC used 2008-2013
Amendment 80	2,325	mt	1,969	2,074	2,254	1,810	1,945	2,168	2,106	2,037
		%	78%	84%	93%	76%	84%	93%	91%	88%
BSAI TLA	875	mt	739	727	484	637	960	707	717	700
		%	84%	83%	55%	73%	110%	81%	82%	80%
Longline Pacific cod CPs	760	mt	564	554	489	477	550	458	412*	521
		%	74%	73%	64%	63%	72%	60%	50%	69%
Other non-trawl	58	mt	1	6	10	5	6	1	*	5
		%	2%	10%	17%	9%	10%	2%	*	9%
Longline Pacific cod CVs	15	mt	5	3	2	1	2	3	7	3
		%	33%	20%	13%	7%	13%	20%	47%	20%
CDQ	393	mt	214	151	159	223	252	265	244	210
		%	62%	44%	40%	57%	64%	67%	62%	53%
Total	**4,426**	mt	**3,493**	**3,516**	**3,398**	**3,153**	**3,714**	**3,603**	**3,406**	**3,301**
		%	**76%**	**78%**	**75%**	**70%**	**84%**	**81%**	**79%**	**75%**

* All 2014 halibut PSC mortality accruing to the other non-trawl PSC limit was intercepted by longline CPs, and is included with that amount.
Source: AKFIN.

Alternative 2 could reduce the amount of halibut PSC mortality in the trawl and longline groundfish fisheries. The alternative includes several options to apply PSC limit reductions to different sectors of the BSAI trawl and longline groundfish fleet. Some of the options under Alternative 2 would result in no change to the status quo, while others would result in constraining PSC limits under which industry may change fishing patterns in order to optimize their groundfish harvest with a minimum of halibut PSC mortality, in order to avoid fishery closures[2]. This could result in a response of reducing fishing effort, as the industry

[2] Note that neither the BSAI pollock fishery nor the BSAI trawl limited access Atka mackerel fishery is constrained by the current cap, nor are there options in the analysis to introduce such constraints. As a result, reduced PSC limits would not affect them directly.

chooses not to pursue less valuable fisheries in order to conserve halibut PSC mortality, or it could result in greater fishing effort at lower catch per unit effort, as vessels change fisheries patterns or seasonal changes in the timing of the fishing, to increase halibut avoidance. Shifts in the location or timing of fishing may occur as a result of Alternative 2. However, there is already considerable interannual variability in the patterns of fishing across the BSAI groundfish sectors, as environmental conditions and avoidance of PSC species have caused vessels to adjust their fishing patterns. Any shift in fishing is likely to occur within the existing footprint of the groundfish fishery in the BSAI.

Pacific halibut

Alternative 1 would result in no change to the amount of halibut PSC mortality in the trawl and longline groundfish fisheries, and it is unlikely that groundfish fishing under the status quo, or Alternative 1, has direct or indirect impacts on Pacific halibut sustainability. While the halibut biomass has declined from peaks in the late 1990s, the estimated female spawning biomass appears to have stabilized or be slightly increasing. Halibut mortality in the groundfish fisheries is taken into account when the commercial halibut quotas are set, to prevent significantly adverse impacts on the halibut stocks.

Halibut PSC removals in the groundfish fisheries are constrained by PSC limits, which provide an upper limit annually on halibut PSC mortality. The level of halibut removals in the trawl and longline groundfish fisheries under the status quo could result in reduced allocations to the directed halibut fisheries in Area 4 through reduced yield, as halibut removals are deducted from the total constant exploitation yield (TCEY) for the halibut stock before a directed fishery allocation is calculated. Any reductions in the directed fishery allocations affect the economic state of commercial halibut fishermen or the communities they impact. At the same time, hook-and-line and trawl industry efforts to reduce halibut PSC mortality in the prosecution of the groundfish fisheries may lower the amount of future removals the IPHC deducts from the TCEY. It is unlikely that halibut harvests in unguided sport and subsistence fisheries are impacted by Alternative 1 because these fisheries do not have caps on removals in Area 4, and harvests in the halibut subsistence and unguided sport fisheries are also deducted from the TCEY prior to the commercial fishery limits being set. Since subsistence and recreational removals are not restricted by catch limits, it is assumed that those sectors are not affected by the status quo or options that reduce the PSC limits.

Alternative 2 includes several options to apply PSC limit reductions to different sectors of the BSAI trawl and longline groundfish fleet, although not all of them result in a change to the status quo, given that the sectors regularly harvest less than the regulated PSC limit (Table ES-3). An important component of PSC mortality is the proportion of fish that is over and under 26 inches in length. Halibut that are over 26 inches (O26) that are killed as PSC would have been a part of the halibut fishery commercial catch limit (FCEY) had they not been killed. Halibut killed as PSC mortality that are under 26 inches (U26), will become available for removals, including to the commercial fishery, in later years. Reductions in O26 halibut mortality resulting from PSC will be directly reallocated to increased halibut yields available to harvesters in the directed halibut IFQ fisheries in Area 4, at an approximately 1:1 relationship between halibut PSC mortality "savings" and directed fishery yield. The O26 component is estimated to be 64 percent of the overall BSAI halibut PSC mortality in 2013 (the last full year of data). Because they are completely allocated to the directed halibut fishery, reductions in O26 halibut PSC mortality will have no effect on the halibut stock condition.

Table ES-3 Comparison of the alternatives and options in terms of harvest and revenue impacts in BSAI fisheries

Note, when numbers are shown as a range, they represent estimates from two Scenarios—Scenario A is a relatively "low impact" scenario and Scenario B is a relatively "high impact" scenario.

	Impacts to the Affected Groundfish Fisheries				Impacts to the Area 4 Commercial Halibut Fishery					
	PSC Limit	Annual Average PSC Taken under the Status Quo and Estimated Mean Future Reductions under the Options	Discounted Present Value (DPV) of Wholesale Revenues under the Status Quo and Foregone DPV under the Options from 2014 to 2023 (2013$ Millions)		Annual Average Status Quo Commercial Halibut Harvest Amounts and Reallocated Average Yield to the Fishery Under the Options. Includes yield from savings of both O26 and U26 PSC. (Net Weight Pounds 1,000s)				Discounted Present Value of Wholesale Revenue under the Status Quo and Gains under the Options. Includes both O26 & U26 ($2013 Millions)	
	(mt)	(mt)	10-Year Sum	Average Annual	4A	4B	4CDE	Area 4	10-Year Sum	Average Annual
Option 1: Reduce Halibut PSC Limits for Amendment 80 Catcher Processors (A80-CPs)										
Status Quo	2,325	2,037 - 2,031	$2,610 - $2,609	$261.0 - $260.9	1,576 - 1,577	1,382 - 1,383	276 - 283	3,234 - 3,242	$349.8 - $350.5	$35.0 - $35.0
1a): -10%	2,093	40 - 59	$5 - $32	$0.5 - $3.2	20 - 12	0 - 2	22 - 50	43 - 63	$4.6 - $6.8	$0.5 - $0.7
1b): -20%	1,860	192 - 217	$36 - $123	$3.6 - $12.2	83 - 28	1 - 7	119 - 195	203 - 230	$21.7 - $24.6	$2.2 - $2.5
1c): -30%	1,628	414 - 435	$105 - $263	$10.5 - $26.2	148 - 64	4 - 15	283 - 379	436 - 458	$46.6 - $49.0	$4.7 - $4.9
1d): -35%	1,511	532 - 562	$164 - $366	$16.3 - $36.5	173 - 81	5 - 31	382 - 480	560 - 592	$59.8 - $63.2	$6.0 - $6.3
1e): -40%	1,395	647 - 664	$229 - $469	$22.8 - $46.7	188 - 94	6 - 35	485 - 568	680 - 698	$72.5 - $74.7	$7.3 - $7.5
1f): -45%	1,279	764 - 777	$293 - $575	$29.2 - $57.2	232 - 114	7 - 43	564 - 659	803 - 816	$85.8 - $87.0	$8.6 - $8.7
1g): -50%	1,163	878 - 894	$375 - $699	$37.3 - $69.6	271 - 133	8 - 56	642 - 750	921 - 939	$98.6 - $100.2	$9.9 - $10.0
Option 2: Reduce Halibut PSC Limits in BSAI Trawl Limited Access Fisheries (BSAI TLA)										
Status Quo	875	699 - 697	$10,222 - $10,214	$1,022.2 - $1,021.4	1,576 - 1,577	1,382 - 1,383	276 - 283	3,234 - 3,242	$349.8 - $350.5	$35.0 - $35.0
2a): -10%	788	12 - 17	$5 - $15	$0.5 - $1.5	6 - 6	0 - 0	6 - 9	12 - 16	$1.3 - $1.7	$0.1 - $0.2
2b): -20%	700	28 - 41	$22 - $59	$2.2 - $5.9	12 - 15	1 - 3	12 - 20	25 - 37	$2.8 - $4.0	$0.3 - $0.4
2c): -30%	613	50 - 76	$59 - $110	$5.9 - $10.9	25 - 31	4 - 4	17 - 33	46 - 68	$4.9 - $7.3	$0.5 - $0.7
2d): -35%	569	60 - 101	$73 - $162	$7.2 - $16.1	29 - 44	4 - 6	20 - 42	54 - 92	$5.8 - $9.8	$0.6 - $1.0
2e): -40%	525	76 - 129	$91 - $208	$9.1 - $20.7	41 - 55	5 - 7	24 - 54	69 - 117	$7.4 - $12.4	$0.7 - $1.2
2f): -45%	481	93 - 165	$110 - $261	$10.9 - $26.0	49 - 66	6 - 8	30 - 75	85 - 150	$9.1 - $16.0	$0.9 - $1.6
2g): -50%	438	114 - 201	$153 - $322	$15.2 - $32.1	59 - 78	7 - 10	38 - 96	104 - 183	$11.1 - $19.6	$1.1 - $2.0
Option 3: Reduce Halibut PSC Limits for Hook and Line Catcher Processors (LGL-CPs) in Pacific Cod Target Fisheries										
Status Quo	760	521 - 521	$1,276 - $1,276	$126.0 - $126.0	1,576 - 1,577	1,382 - 1,383	276 - 283	3,234 - 3,242	$349.8 - $350.5	$35.0 - $35.0
3a): -10%	684	These options are non-constraining and have no material impact on the affected participants.								
3b): -20%	608									
3c): -30%	532	14 - 25	$10 - $22	$1.0 - $2.2	5 - 7	12 - 5	1 - 18	17 - 29	$1.9 - $3.2	$0.2 - $0.3
3d): -35%	494	32 - 46	$25 - $44	$2.5 - $4.4	8 - 11	19 - 8	12 - 33	38 - 53	$4.2 - $5.7	$0.4 - $0.6
3e): -40%	456	61 - 79	$50 - $89	$5.0 - $8.9	22 - 23	27 - 10	21 - 58	71 - 92	$7.6 - $9.8	$0.8 - $1.0
3f): -45%	418	100 - 118	$100 - $138	$10.0 - $13.7	39 - 35	30 - 12	46 - 87	115 - 135	$12.3 - $14.4	$1.2 - $1.4
3g): -50%	380	138 - 153	$152 - $191	$15.2 - $19.0	66 - 44	34 - 15	58 - 116	158 - 175	$16.9 - $18.8	$1.7 - $1.9
Option 4: Reduce Halibut PSC Limits for Hook and Line Catcher Processors and Catcher Vessels in Target Fisheries Other than Pacific Cod or Sablefish										
Status Quo	58	5	$11.95							
All Options	These options are non-constraining and have no material impact on the affected participants.									
Option 5: Reduce Halibut PSC Limits for Hook and Line Catcher Vessels (LGL-CVs) in Pacific Cod Target Fisheries										
Status Quo	15	3	$1.20							
All Options	These options are non-constraining and have no material impact on the affected participants.									
Option 6: Reduce Halibut PSC Limits for Vessels Participating in CDQ Groundfish Fisheries										
Status Quo	393	211 - 211	$1,606.3 - $1,606.3	$160.6 - $160.6	1,576 - 1,577	1,382 - 1,382	276 - 283	3,234 - 3,242	$349.8 - $350.5	$35.0 - $35.0
6a): -10%	354									
6b): -20%	314	These options are non-constraining and have no material impact on the affected participants.								
6c): -30%	275									
6d): -35%	255	2 - 2	$0.4 - $2.2	$0.0 - $0.2	2 - 3	0.0 - 0.0	2 - 0	4 - 3	$0.4 - $0.3	$0.0 - $0.0
6e): -40%	236	8 - 8	$2.7 - $9.3	$0.3 - $0.9	6 - 3	0.1 - 0.1	3 - 6	9 - 9	$1.0 - $1.1	$0.1 - $0.1
6f): -45%	216	18 - 17	$6.3 - $21.2	$0.6 - $2.1	8 - 5	0.1 - 0.1	12 - 13	19 - 18	$2.1 - $2.0	$0.2 - $0.2
6g): -50%	197	30 - 29	$15.2 - $36.7	$1.5 - $3.7	12 - 6	0.7 - 1.5	20 - 22	32 - 30	$3.4 - $3.2	$0.3 - $0.3

Table ES-4 Comparison of Halibut Fishery Yield Impacts from U26 PSC Savings in the BSAI, in Areas External to the BSAI (Gulf of Alaska, British Columbia, Pacific Coast)

	From Option 1 A80-CPs		From Option 2 BSAI TLA		From Option 3 LGL-CPs		Option 6 CDQ Fisheries	
PSC Limit Cut Percent	Annual Average Harvest from U26 Savings from 2019 to 2023 (1,000's n.w. lb)	10-Year Sum of Future Discounted Present Value of Wholesale Revenue (2013 $millions)	Annual Average Harvest from U26 Savings from 2019 to 2023 (1,000's n.w. lb)	10-Year Sum of Future Discounted Present Value of Wholesale Revenue (2013 $millions)	Annual Average Harvest from U26 Savings from 2019 to 2023 (1,000's n.w. lb)	10-Year Sum of Future Discounted Present Value of Wholesale Revenue (2013 $millions)	Annual Average Harvest from U26 Savings from 2019 to 2023 (1,000's n.w. lb)	10-Year Sum of Future Discounted Present Value of Wholesale Revenue (2013 $millions)
-10%	8 to 12	$0.34 to $0.50	4 to 5	$0.13 to $0.18	These suboptions are not expected to produce material impacts		These suboptions are not expected to produce material impacts	
-20%	38 to 43	$1.60 to $1.79	7 to 11	$0.30 to $0.44				
-30%	83 to 86	$3.48 to $3.64	12 to 19	$0.52 to $0.82	2 to 5	$0.10 to $0.18		
-35%	106 to 112	$4.47 to $4.72	16 to 26	$0.64 to $1.09	5 to 7	$0.23 to $0.33	0 to 0	$0.02 to $0.01
-40%	129 to 133	$5.44 to $5.59	19 to 32	$0.81 to $1.37	10 to 13	$0.42 to $0.56	1 to 2	$0.07 to $0.07
-45%	153 to 156	$6.44 to $6.54	24 to 42	$0.99 to $1.75	17 to 20	$0.70 to $0.84	4 to 4	$0.17 to $0.16
-50%	176 to 179	$7.38 to $7.53	29 to 50	$1.21 to $2.11	23 to 26	$0.98 to $1.09	6 to 6	$0.27 to $0.26

Note: The first yield increases from U26 PSC Savings that accrue as a result of PSC limit reductions are not realized until 2019. For this reason average annual harvests are estimated over the last five years only. Also note that when numbers are shown as a range, they represent estimates from two Scenarios—Scenario A is a relatively "low impact" scenario and Scenario B is a relatively "high impact" scenario.

Reductions in halibut PSC mortality of U26 fish will also contribute to increased halibut yields for the directed halibut fishery, at the same pound for pound relationship, but will be distributed across all regulatory areas as the fish contribute to the exploitable biomass. Based on the IPHC setline survey, Area 4 represents 22 percent of the exploitable biomass (halibut over 32 inches) for the coastwide halibut stock, therefore approximately 22 percent of the U26 halibut PSC mortality reductions would, at some future time, accrue back to the Area 4 directed fisheries as halibut yield (Table ES-3). The remainder of the U26 halibut "savings" would accrue to directed halibut users in other IPHC regions, in proportion to their share of the coastwide biomass (Table ES-4). With respect to whether removals of U26 halibut have an effect on the condition of the halibut stock, mortality of juvenile halibut will have an effect on the distribution of the surviving fish, and therefore the subsequent spawning biomass. It is not currently known how important the spatial distribution of the spawning stock may be to short or long-term stock productivity, but greater mortality at younger ages is likely to change this distribution more than mortality at older ages. Reductions in U26 halibut PSC mortality could make more halibut of various sizes available in the BSAI. The extent to which this may affect the halibut spawning biomass coastwide depends on the importance of spatial distribution of the spawning stock, but any effect of the PSC limit reductions in the BSAI will be tempered by the proportion of the reduction that affects U26 halibut (currently 34 percent of halibut PSC mortality), and the BSAI's overall proportion of total coastwide biomass (currently 22 percent). It is notable that while the majority of coastwide U26 halibut PSC mortality occurs in Area 4CDE, the proportion of the coastwide biomass in this area has been stable with a slight increase over the last fifteen years.

A caveat of the simulation model used to analyze the options in Alternative 2 is that it does not account for changing halibut biomass levels; the model uses a static halibut biomass equivalent to the 2014 biomass estimate. While the biomass has been stable at around 200 million lb net weight in the last few years, this represents the lowest biomass level since 1996, although not in the historical time series. Fixing reduced halibut PSC limits for the groundfish fisheries at a time when the halibut biomass is at a lower abundance level raises questions about the implication of lower PSC limits when the biomass increases, potentially leading to higher encounter rates. An IPHC study (Leaman et al. 2015) tried to index halibut PSC to direct measures of juvenile or adult halibut abundance, or encounter rates of halibut in relation to target groundfish species abundance, and was unsuccessful. The study found that relationships of PSC mortality to halibut and target groundfish abundance are either lacking, or are temporally and spatially inconsistent. The

historical patterns in PSC mortality are more likely driven by groundfish management factors than strictly by halibut abundance.

For the most part, the options in Alternative 2 which would result in a change from status quo, in terms of halibut PSC mortality, are unlikely to have a different effect on halibut, as catch will largely be reallocated from halibut PSC mortality to directed fishery catch, although there may be some conservation benefit to the stock with respect to reducing the mortality of U26 halibut. Alternative 2 is not anticipated to have a significant effect on the Pacific halibut biomass.

Other resource components

Under the status quo, the BSAI groundfish stocks are neither overfished nor subject to overfishing, and levels of fishing on ecosystem component species (including forage fish and prohibited species) are constrained by bycatch and PSC limits. Under the more constraining options of Alternative 2, reduced PSC limits may result in some groundfish fisheries closing before the total allowable catch (TAC) is reached, which will result in less impact on the stock, or fishing occurring in areas of lower catch per unit effort. While this may result in higher interception of incidental species, the groundfish stocks, forage fish and prohibited species are also managed under catch, bycatch and PSC limits, which mitigate risk to these stocks. Groundfish harvest reductions under the combined options could range between 1,400 to 147,800 mt annually, primarily affecting flatfish species. Prior to the implementation of Amendment 80 in 2008, flatfish harvests were routinely lower than current levels, by amounts in excess of the proposed harvest reductions projected in this analysis. For groundfish stocks, the biological effects are expected to be correctly incorporated in stock assessments and the harvest specifications process.

Marine mammal and seabird disturbance and incidental take are at low levels and are mitigated by groundfish fishery area closures. Under Alternative 2, there may be changes in fishing patterns that result in more fishing effort (at lower catch per unit effort), in response to potentially constraining PSC limits. This is most likely to occur in trawl fisheries, where limits are more constraining. Neither disturbance, incidental take, changes in prey availability or benthic habitat alteration, however, is anticipated to increase to a level that would result in population level effects on marine mammals or seabirds.

Previous analyses have found no substantial effects to habitat in the BSAI from fishing activities (NMFS 2005b). Under Alternative 2, any increase in fishing effort would still occur within the existing footprint of fishing and existing habitat and conservation measures, and is unlikely to be significant.

Regulatory Impact Review

The RIR describes the status quo with respect to participants in each of the affected sectors, catch and revenue, regional impacts, PSC limits and associated mortality in target fisheries, reliance on BSAI groundfish and diversification into other fisheries. A description of catch and revenue in the commercial halibut fishery is also included, along with a summary of its regional impact. To analyze the effects of Alternative 2, the analysis uses an iterated multi-year simulation model, which uses the basis years of 2008 to 2013 to forecast future impacts of the PSC limit reductions. There are two aspects to the modeling of impacts of PSC limit reductions: how to account for fishermen's response to constrained limits by optimizing their groundfish fishing to the extent possible (noting that their ability to respond effectively is more difficult when PSC limit reductions, or other management measures affecting them, are more constraining), and how "savings" of halibut PSC mortality in the groundfish fisheries affect other sectors, in this case, the commercial halibut fishery. The model uses two scenarios to mimic how industry would respond to a lower PSC limit, which is achieved in both cases by reducing groundfish fishing effort. The scenarios employ different methods of dropping groundfish harvest records to meet the new PSC limit, and they are intended to represent reasonable expectations of fishermen's behavioral response to the reduced limits, and illustrate lower and upper bounds of the impact of the PSC limit reduction. For the impact on

the halibut fishery, the model uses algorithms that mimic the application of the IPHC blue line harvest policy application, to generate recommendations for the coming year's Fishery Constant Exploitation Yield (FCEY), or catch limit for the directed halibut fishery. For the public review draft of this analysis, the IMS Model has been modified to account for future yield increases from U26 fish, as well as immediate yield increases from O26 halibut.

Groundfish fisheries

Table ES-3 summarizes the Alternative 2 PSC limit reduction options in terms of their halibut PSC mortality reductions in the groundfish fishery and the foregone discounted present value associated with those reductions. The table also shows how halibut PSC reductions would translate into reallocations to the directed halibut fishery yield, and the associated gain in discounted present value, taking into account O26 fish as well as potential future U26 yield.

Only some of the options would result in a change to the status quo, given that the sectors regularly harvest less than the regulated PSC limit.

- For the Amendment 80 sector (Option 1), all of the PSC limit reduction options would have been constraining in some of the years 2008 to 2013, and all of the options are likely to be constraining in some future years.
- For the Bering Sea trawl limited access sector (Option 2), all of the PSC limit reduction options would have been constraining in some years from 2008 to 2013, and all of the options are likely to be constraining in some future years.
- For Pacific cod longline catcher processors (Option 3), reductions of 30 percent or higher would be likely to constrain this sector in the future. Reductions of 10 or 20 percent would not have constrained the fishery in any of the years from 2008 to 2013, and unless the Pacific cod TACs grow considerably larger in future, these options are unlikely to be constraining.
- There would not have been an effect of any of the reduction options on the PSC limit that is apportioned to other non-trawl fisheries (i.e., targeting species other than Pacific cod or sablefish) (Option 4), or on Pacific cod longline catcher vessels (Option 5), during the years 2008 to 2013. Given the current lack of growth in either of these fisheries, it is unlikely that any of the proposed options would be constraining in the future.
- For CDQ groups (Option 6), only reductions of 35 percent or higher would be likely to constrain this fishery in the future, unless the fishery continues its current rate of growth. Reductions from 10 to 30 percent would not have constrained the CDQ groundfish activities in any of the years from 2008 to 2013.

The impacts of equal PSC percentage reduction options across all sectors on total groundfish catch are illustrated in Figure ES-1 and ES-2. Figure ES-1 provides a pie chart showing the impacts of the PSC limit reduction options for all groundfish fisheries, including the pollock fishery. The reduction in groundfish catch resulting from each analyzed option is shown as a portion of the pie chart. The effect of increasingly larger PSC reductions, as applied across all sectors equally, is illustrated in the change in colors. The PSC reduction options result in a reduction in total groundfish harvest between 5.3 and 9.2 percent of status quo.

Figure ES-2 presents the same data, but excludes the pollock fishery, as the volume of the pollock tends to overshadow the impacts on groundfish fisheries, and the pollock fishery is exempt from a fishery closure even if the PSC limit for the BSAI trawl limited access sector pollock fishery category is attained. In the analysis, therefore, the options have no direct effect on the (non-CDQ) pollock fishery. In Figure ES-2, the reduction in groundfish harvest for all species except pollock ranges between 16.7 and 22 percent.

Figure ES-1 Impacts to in Total Groundfish Harvest (Including Pollock) Under the Combined PSC Limit Reduction Options for All Sectors

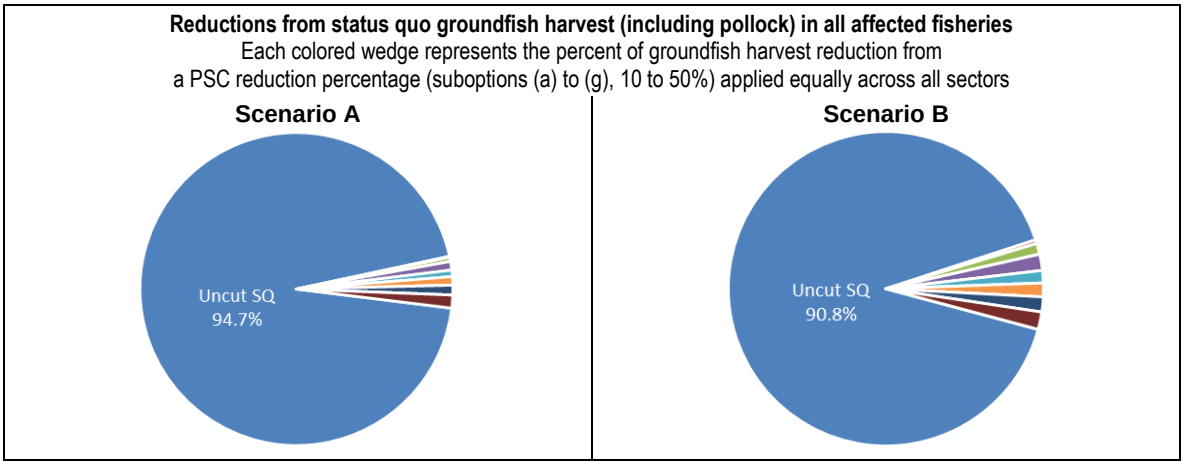


Figure ES-2 Impacts to Total Groundfish Harvest (Excluding Pollock) Under the Combined PSC Limit Reduction Options for All Sectors

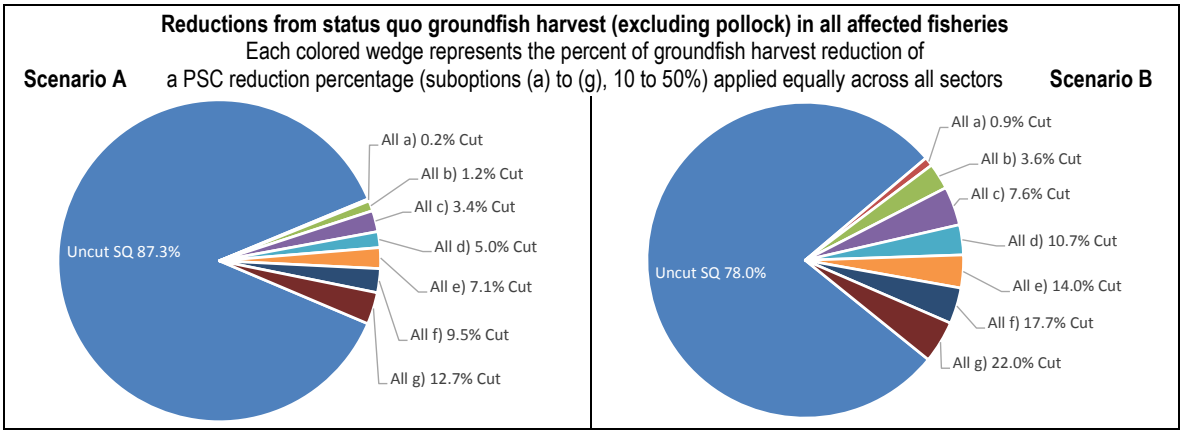
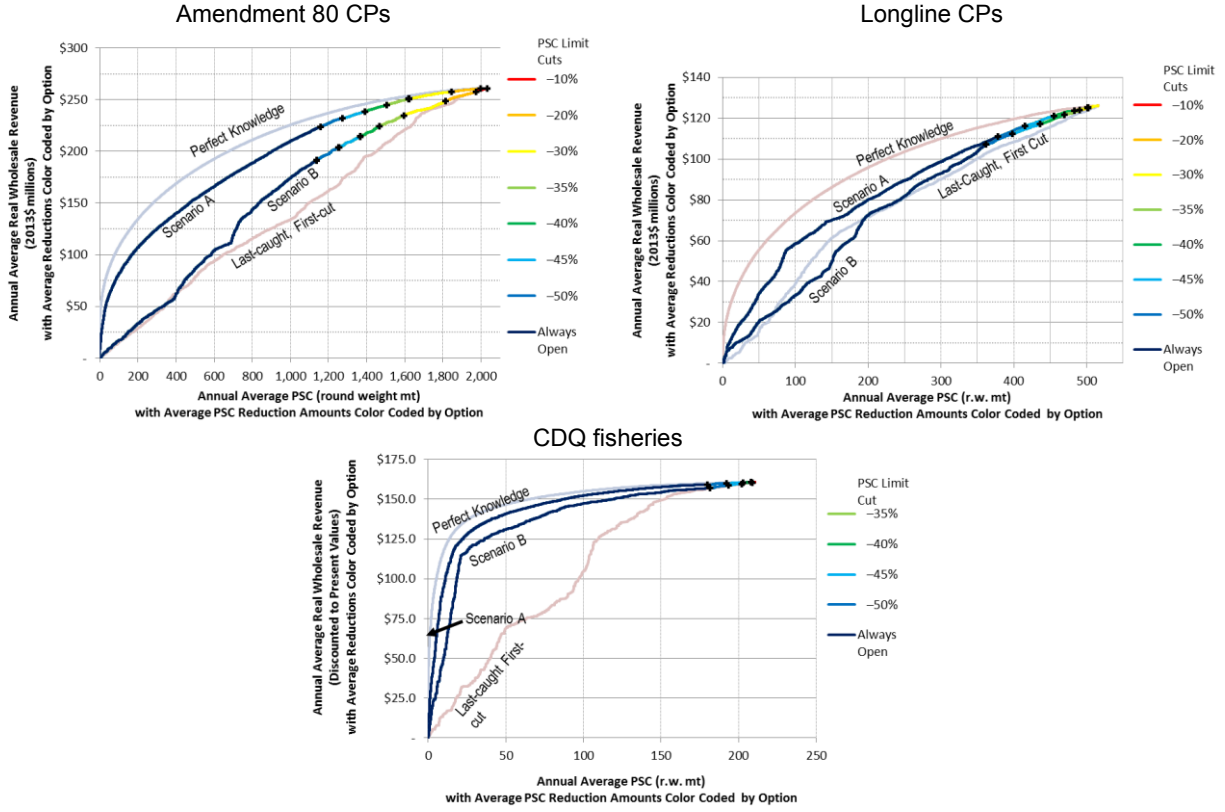


Figure ES-3 shows catch progression charts for the impacts of individual sectors, where it was possible to create them. The figures highlight that there is often not a strict linear relationship between the reduction of PSC mortality and the reduction of revenue to the sector. For example, for the Amendment 80 CPs, shows the Scenario A trajectory as a curve, which becomes flatter in the upper right-hand quadrant of the graph. The bolded ✚ marks the spot on the catch progression line corresponding with the PSC reduction percentages in the Council's alternative, and the segments are incrementally color-coded to indicate the additional amount of annual average wholesale revenue (discounted to present values) that is projected as foregone with each percentage reduction. In Scenario A for Amendment 80, the additional foregone revenue associated with moving from a ten to a twenty percent reduction in the PSC limit is relatively little compared with the reduction in moving for example from a forty-five to a fifty percent reduction, for which the trajectory of the line is much steeper. It is important to note that in terms of absolute foregone revenue, the larger percentage reductions also incorporate the segments from all the previous reductions as well.

The Amendment 80 CP graph shows the catch progression line for Scenario B as well as alternative catch progression lines, for comparison. The 'perfect knowledge' line would result if the IMS Model had assumed the sector had perfect knowledge in advance about their upcoming harvests, and chose not to fish as many individual trips with the lowest revenue to PSC ratio as necessary in order to meet the PSC constraint. Conversely, the last-caught first-cut reduction methodology assumes that fishermen would not change

behavior in any way in response to a reduced PSC limit, and vessels fish as they did historically until the fishery is closed. There is a much more linear relationship between PSC and revenue under the last-caught-first-cut methodology. For longline CPs, the fact that Scenario A and B are closer to the last-caught-first-cut catch progression line may be an indicator that the longline CPs are already operating in a manner that keeps PSC mortality at relatively low levels. For CDQ fisheries, the resemblance of the Scenario A and B lines to the "perfect knowledge" progression line is striking, and may be related to the fact that vessels operating CDQ groundfish fisheries are allowed to declare after the fact, whether a tow will count against a CDQ allocation, or whether it will be a part of the non-CDQ operations.

Figure ES-3 Annual Average Discounted Present Value of Wholesale Revenue and Halibut PSC under the PSC Limit Reduction Options for Amendment 80 CPs, Longline CPs and CDQ



One downside of using the catch progression lines to display impacts over multiple years is that the considerable interannual variability that occurs with respect to annual PSC mortality is lost. The actual model used to generate the impact analysis used the yearly equivalent of the catch progression lines shown in the figure. Table ES-2 illustrates this variability in the PSC mortality values for each sector for 2008 to 2014.

For groundfish sectors, in addition to overall harvest and revenue impacts, the analysis also summarizes the impacts of the PSC limit reduction options to crew members, and payments to crew members. Table ES-5 shows the annual average discounted present value of payments to crew under the status quo (for example, $71 million for Amendment 80) over the 10-year future period, and then shows the projected reductions in the annual average present value of crew payments under the options. Two alternative ways to deal with the reductions are also discussed in the RIR: companies can keep the same number of crew employees as under the status quo, and reduce everyone's compensation proportionally; or they can cut the number of persons employed and maintain the same level of payments per person. Most likely the end result will be a combination of both. For Amendment 80 vessels, the analysis further highlights two separate components

of the Amendment 80 fleet: vessels with significant participation in Atka mackerel fisheries, and flatfish-focused vessels. In general, the Atka mackerel CPs and their crews are projected to experience smaller negative consequences on a percentage basis than CPs and crews that focus on flatfish. The primary reason for the differential impact is that in general, the Atka mackerel fishery has much lower halibut encounter rates than in the average flatfish target fishery. Similar subdivisions of the BSAI trawl limited access fleet, based on the relative dependence on the AFA pollock fishery, are described in the RIR and used to assess differential impacts to five different components of this relatively large and heterogeneous group of vessels.

Table ES-5 Average Annual Impacts of PSC Limits to Crew Members, for Amendment 80, BSAI trawl limited access, and longline CPs

DPV of Average Payments to Crew (2013 $millions)		Status Quo	1a: –10%	1b: –20%	1c: –30%	1d: –35%	1e: –40%	1f: –45%	1g: –50%
Amendment 80 CPs	Scen A	$71.05	($0.13)	($0.98)	($2.85)	($4.44)	($6.20)	($7.94)	($10.16)
	Scen B	$71.02	($0.87)	($3.32)	($7.13)	($9.93)	($12.70)	($15.58)	($18.96)
BSAI TLA	Scen A	$191.93	($0.12)	($0.45)	($1.14)	($1.39)	($1.76)	($2.08)	($2.73)
	Scen B	$191.75	($0.30)	($1.26)	($2.31)	($3.16)	($3.92)	($4.84)	($6.02)
Longline Pcod CPs	Scen A	$44.12	-	-	($0.36)	($0.87)	($1.76)	($3.49)	($5.30)
	Scen B	$44.12	-	-	($0.78)	($1.55)	($3.13)	($4.80)	($6.66)

There are three ways to reduce PSC mortality in the groundfish fisheries. The first is simply to reduce groundfish fishing effort. Second, the fleet can reduce encounters with halibut. This requires some knowledge of where halibut are, to avoid fishing in those areas to begin with, or at least requires a change in behavior for fishermen to move away from areas of high halibut interception once landings demonstrate that there are halibut on the grounds. The fleet also can modify the gear used in the water, to encourage halibut to escape before they can be landed. Third, reductions can be achieved by reducing the mortality of halibut that encounter the fishing gear. This can involve changes both to gear and handling procedures, to improve the survivability of halibut once they are released back into the water.

Mathematically, these three factors can be translated to halibut PSC (kg) = groundfish (mt) × halibut encounter rate (kg/mt) × discard mortality rate (DMR). A reduction of an equivalent percentage in any one of the three components has the same relative impact on halibut PSC. While reductions in halibut encounters and/or total groundfish are in the control of the fishermen, through changes in fishing patterns and techniques, the discard mortality rates are determined through the harvest specifications process.

In the impacts analysis for this action, the modelled response to reduced PSC limits is to reduce total groundfish harvest. The methodology includes, however, an assumption that, where possible, fishermen will optimize their harvest in response to constraining limits, for example by prioritizing fishing operations in the best target-area-months for revenue per mt of halibut PSC, and reducing effort in the least efficient months. The effect of optimization is to change both total groundfish and the halibut encounter rate to achieve PSC reduction. In most cases, changes in halibut encounters are larger, on a percentage basis, than changes in total groundfish harvest (Table ES-5), and this, the analysts assert, is an indication that behavior changes have occurred. For example, under the 50 percent reduction option with Scenario A for Amendment 80 CPs, a PSC mortality reduction of 43 perent is achieved with reductions in the halibut encounter rate of 32 percent and of the groundfish harvest by only 16 percent. The BSAI TLA sector, which still operates under a race for fish for some target fisheries, has fewer options to optimize fishing and respond with behavior change. For example, at a 50 percent reduction under Scenario A, to reduce halibut PSC by 27 percent requires a reduction in groundfish harvests of 21 percent.

Table ES-5 Groundfish Harvest Changes (Δ) and Resulting Changes in Halibut Encounters and Halibut Encounter Rates for Amendment 80 CPs, BSAI trawl limited access, and Longline CPs

		Percentage Change from Status Quo Under the Suboptions							
	Variable	1a: -10%		1b: -20%	1c: -30%	1d: -35%	1e: -40%	1f: -45%	1g: -50%
A80-CPs					**Scenario A**				
	Groundfish Harvest (Δ %)	-0.2%	-1.3%	-1.7%	-4.7%	-7.1%	-9.9%	-12.7%	-16.2%
	Halibut Encounters (Δ %)	-1.9%	-2.9%	-9.4%	-20.4%	-26.2%	-31.9%	-37.6%	-43.2%
	Halibut Encounter Rate (Δ %)	-1.7%	-1.6%	-7.8%	-16.4%	-20.6%	-24.4%	-28.5%	-32.2%
	Halibut PSC mortality (Δ %)	-2.0%	-2.9%	-9.4%	-20.3%	-26.2%	-31.8%	-37.5%	-43.1%
					Scenario B				
	Groundfish Harvest (Δ %)	-1.3%		-5.1%	-10.7%	-14.8%	-18.8%	-23.0%	-28.1%
	Halibut Encounters (Δ %)	-2.9%		-10.6%	-21.4%	-27.7%	-32.7%	-38.2%	-44.0%
	Halibut Encounter Rate (Δ %)	-1.6%		-5.8%	-11.9%	-15.1%	-17.1%	-19.8%	-22.2%
	Halibut PSC mortality (Δ %)	-2.9%		-10.7%	-21.4%	-27.7%	-32.7%	-38.2%	-44.0%
BSAI TLA					**Scenario A**				
(excluding	Groundfish Harvest (Δ %)	-0.9%		-3.4%	-8.2%	-10.2%	-13.4%	-15.8%	-21.0%
pollock)	Halibut Encounters (Δ %)	-2.8%		-6.4%	-11.6%	-13.8%	-17.7%	-21.8%	-26.8%
	Halibut Encounter Rate (Δ %)	-2.0%		-3.1%	-3.7%	-4.0%	-5.0%	-7.1%	-7.4%
	Halibut PSC mortality (Δ %)	-3.0%		-6.6%	-12.1%	-14.3%	-18.2%	-22.4%	-27.4%
					Scenario B				
	Groundfish Harvest (Δ %)	-2.3%		-10.0%	-18.4%	-24.9%	-31.0%	-38.1%	-45.9%
	Halibut Encounters (Δ %)	-3.9%		-9.6%	-17.8%	-24.1%	-30.8%	-39.4%	-48.3%
	Halibut Encounter Rate (Δ %)	-1.6%		+0.4%	+0.6%	+1.1%	+0.3%	-2.1%	-4.5%
	Halibut PSC mortality (Δ %)	-4.1%		-10.0%	-18.3%	-24.6%	-31.2%	-39.8%	-48.7%
LGL-CPs					**Scenario A**				
	Groundfish Harvest (Δ %)	-		-	-0.7%	-1.9%	-3.8%	-7.8%	-11.9%
	Halibut Encounters (Δ %)	-		-	-2.5%	-5.9%	-11.3%	-18.8%	-26.1%
	Halibut Encounter Rate (Δ %)	-		-	-1.8%	-4.1%	-7.7%	-12.0%	-16.1%
	Halibut PSC mortality (Δ %)	-		-	-2.7%	-6.2%	-11.7%	-19.2%	-26.4%
					Scenario B				
	Groundfish Harvest (Δ %)	-		-	-1.7%	-3.4%	-6.9%	-10.8%	-15.0%
	Halibut Encounters (Δ %)	-		-	-4.6%	-8.5%	-14.9%	-22.3%	-29.1%
	Halibut Encounter Rate (Δ %)	-		-	-3.0%	-5.3%	-8.5%	-12.9%	-16.5%
	Halibut PSC mortality (Δ %)	-		-	-4.8%	-8.8%	-15.3%	-22.6%	-29.4%

Even though handling practices that measurably reduce the discard mortality rate in a groundfish fishery would have the same effect as a reduction in actual PSC of the same percentage, these changes will not be accounted for in the estimation of PSC mortality without a change to the Council's process for calculating DMRs, which is currently based on a ten-year average of observed release condition. In 2015, one of the the Amendment 80 cooperatives is operating a deck sorting exempted fishing permit (EFP), which is evaluating a process to sort halibut on deck in order to improve release condition and survivability. Under the EFP, vessels are not subject to the assumed DMR adopted by the Council in the harvest specifications process for deck-sorted hauls, and will be credited with the actual halibut release condition for fish that are sorted on deck, although all halibut that are not sorted on deck and flow through to the factory will have a higher mortality rate assigned as the catch monitoring requirements of the EFP require them to be held longer than they would under normal fishing conditions. The EFP, if successful, will inform the development of a process for identifying an assumed DMR for deck-sorted tows that can be adopted on a periodic basis, as with current DMRs.

Directed halibut fishery

The net effect of this action on the directed halibut fishery will be the cumulative result of the chosen PSC reduction options for multiple sectors. Table ES-6 summarizes the impacts of applying the same percentage reduction option to each of the affected sectors. For example, the rows showing outcomes under a -10% change include a 10 percent reduction in halibut PSC limits for the Amendment 80 CPs, the BSAI trawl limited access fisheries, the longline CPs and the groundfish CDQ fisheries (there are no impacts associated under any of the percentage reduction levels for longline catcher vessels or the non-trawl other targets PSC limit; Table ES-3). For example, with 30 percent proposed PSC limit reductions for all sectors, it is projected that the entire Area 4 halibut fishery could realize an increase in annual average harvest volumes by up to 18 percent. Note that under PSC limit reductions of 50 percent, projected increases to harvest volumes in Area 4CDE would be expected to range between 275 and 349 percent of status quo levels, which, as modelled, were very low – lower, in fact, than current or historic levels of harvest. This is because the model mimics the blue line application of the IPHC harvest policy, without adjustments to the directed fishery harvest limit (as occurred in 2015 for Area 4CDE), so this represents an increase from the blue line catch limits for Area 4CDE, not the actual 4CDE harvest limit as adopted.

Table ES-6 Summary of harvest impacts for commercial halibut fishery from reductions across all sectors combined, in pounds net weight

Option	Commercial Halibut Fishery Impacts							
	Scenario A				Scenario B			
	4A	4B	4CDE	Area 4	4A	4B	4CDE	Area 4
	Average Annual Change from the Status Quo in Commercial Halibut (net weight 1,000s pounds)							
Status Quo	1,549	1,382	276	3,207	1,549	1,383	283	3,215
All Sectors: -10%	52	0.4	28	81	44	2	59	105
All Sectors: -20%	122	2	132	256	69	10	215	293
All Sectors: -30%	203	20	302	525	126	24	431	581
All Sectors: -35%	235	29	416	679	162	45	557	764
All Sectors: -40%	279	38	534	852	199	53	688	941
All Sectors: -45%	351	43	653	1,046	244	63	835	1,143
All Sectors: -50%	431	50	758	1,239	284	82	986	1,353

Table ES-4 provides a summary of impacts to areas outside of the BSAI, from future yield of U26 halibut. For example, with a 30 percent PSC reduction across all sectors, future annual yield to halibut fisheries outside of Area 4 would be up to 145,000 net weight pounds. Under a similar 50 percent reduction, the increased future yield would be up to 261,000 net weight pounds.

Community analysis

The community analysis evaluates community and regional participation patterns in the BSAI groundfish and halibut fisheries. In general, the potential beneficial impacts to the various halibut fisheries would be spread more widely among Alaska communities than would be the potential adverse impacts to the groundfish fisheries. While there are many more Alaska communities directly engaged in the BSAI halibut fisheries than in the BSAI groundfish fisheries in general, the communities that are assumed to have the greatest potential for realizing substantial beneficial impacts under Alternative 2 are 15 communities identified as halibut-dependent. These are Adak, Atka, Akutan, Chefornak, Hooper Bay, Kipnuk, Merkoyuk, Newtok, Nightmute, Savoonga, St. George, St. Paul, Toksook Bay, Tununak, and

Unalaska. Relative levels of BSAI halibut fishery engagement for these communities along with selected demographic characteristics are shown graphically in Table ES-8[3].

Table ES-8 Graphic Representation of Potentially Affected BSAI Halibut-Dependent Communities' Annual Average Engagement in BSAI Halibut Fisheries

Community	CDQ Group	Community Size	Proportion of Total Population			Shore-Based Processing Location	Number of Halibut CVs	Halibut Ex-Vessel Gross Revenues as Percentage of Total Ex-Vessel Gross Revenues	
			Alaska Native	Minority	Low-Income			Halibut CVs Only	All Community CVs
Adak		•	•	●	○	•	•		
Akutan	APICDA	○	•	●	○	○	•	●	●
Atka	APICDA	•	●	●	•	•	•		
St. George	APICDA	•	●	●	•	•	•		
Unalaska		○	•	○	•	●	●	●	○
St. Paul	CBSFA	•	●	●	•	○	●	●	●
Chefornak	CVRF	•	●	●	○	•	●	●	•
Hooper Bay	CVRF	○	●	●	●	•	○	●	•
Quinhagak*	CVRF	•	●	●	●	•	○		
Kipnuk	CVRF	•	●	●	●	•	●	●	•
Mekoryuk	CVRF	•	●	●	○	•	●	●	●
Newtok	CVRF	•	●	●	●		○	●	○
Nightmute	CVRF	•	●	●	○		○	●	●
Toksook Bay	CVRF	•	●	●	•	•	●	●	○
Tununak	CVRF	•	●	●	●	•	●	●	●
Nome*	NSEDC	○	○	○	•	○	○	○	•
Savoonga	NSEDC	•	●	●	●	•	○	●	●

*Note: Quinhagak and Nome were not identified as BSAI halibut-dependent communities. Quinhagak has been included to allow for more complete data disclosure than would be possible otherwise; Nome has been included as a regional center (and was close to a dependency threshold).

KEY for Table

Type/Level of Engagement		•	○	●
Community Size	2010 population =	less than 1,000	1,000 – 9,999	greater than 10,000
Alaska Native and Minority Proportion	2010 population =	less than 50 percent	50.0 – 74.9 percent	75.0 or more percent
Low-Income Population Proportion	2010 population =	less than 15 percent	15.0 – 24.9 percent	25.0 or more percent
BSAI Halibut Shore-Based Processing Participation	2008-13 annual avg. =	0.5 – 0.9 plants	1.0 – 1.9 plants	2.0 or more plants
BSAI Halibut Catcher Vessel Participation	2008-13 annual avg. =	1.0 – 4.9 vessels	5.0 – 9.9 vessels	10.0 or more vessels
BSAI Halibut Ex-Vessel Gross Revenue Proportion	2008-13 annual avg. =	less than 25 percent	25.0 – 49.9 percent	50.0 or more percent

[3] Note, there will be benefits realized to halibut-dependent communities in the GOA, British Columbia, and the Pacific coast also from the reduction in PSC mortality of U26 fish in the BSAI, as summarized in Table ES-4, but the effects of are much lower on halibut fisheries outside of Area 4, and will be realized over a long range of years, not beginning until 4 to 7 years after the instance of PSC reduction in the BSAI. As a result, this document focuses on community-level impacts to BSAI / Area 4 communities.

Relatively few Alaska communities directly and on a consistent basis participate in the BSAI groundfish fisheries, as determined by location of community resident-owned vessels participation in the fishery and/or location of shore-based processor participation in the fishery in 2008 to 2013. Table ES-9 summarizes BSAI groundfish fishery participation patterns for Alaska communities substantially dependent on or substantially engaged in the harvest or processing of fishery resources to meet social and economic needs of these communities and the likely community-level impacts of Alternative 2 on these communities. It should be noted also that CDQ communities participate in the BSAI groundfish fishery in multiple ways, not only through quota ownership but through investment in direct fishery participation in a variety of sectors as well, with specific direct fishery and sector participation engagement and dependency varying by CDQ group. Depending on specific patterns of investment in direct participation, individual CDQ groups and their communities could be impacted by any of the Alternative 2 options, suboptions, and level of BSAI halibut PSC reduction in ways similar to other direct fishery participants.

Table ES-9 Graphic Representation of Potentially Affected Alaska Communities' Annual Average Engagement in BSAI Groundfish and Halibut Fisheries

Note, however, that the Seattle metropolitan statistical area has the greatest engagement, by far, for all communities in all categories (except BSAI groundfish hook-and-line catcher vessels and being the location of BSAI groundfish and halibut shore-based processing). Newport (Oregon) has the second-highest engagement in the BSAI groundfish trawl catcher vessel sector.

Community	Relative Community Size	BSAI Groundfish Engagement					BSAI Halibut Engagement	
		Locally Owned Catcher Vessels		Locally Owned Catcher Processors		Shore-Based Processing Location	Locally Owned Catcher Vessels	Shore-Based Processing Location
		Trawl	Hook & Line	Trawl	Hook & Line			
Adak	•		•			○	•	•
Akutan	○					○	•	○
Anchorage	●		•	•	○	•		
King Cove	•					○		
Kodiak	○	●	•			•	●	
Petersburg	○				●			
Sand Point	•	•				○		
Unalaska	○		●			●	●	●

Note: the only Alaska communities not included in the table that have BSAI groundfish values in the ranges shown are Anchor Point and Juneau, with hook-and-line catcher vessel participation in the 1.0-2.9 and 0.5-0.9 annual average vessel categories, respectively.

KEY for Table

Type/Level of Engagement		•	○	●
Community Size	2010 population =	less than 1,000	1,000 – 9,999	10,000 or more
BSAI Groundfish Catcher Vessel Participation	2008-13 annual avg. =	0.5 – 0.9 vessels	1.0 – 2.9 vessels	3.0 or more vessels
BSAI Groundfish Catcher Processor Participation	2008-13 annual avg. =	0.5 – 0.9 vessels	1.0 – 2.9 vessels	3.0 or more vessels
BSAI Groundfish Shore-Based Processing Participation	2008-13 annual avg. =	0.5 – 0.9 plants	1.0 – 1.9 plants	2.0 or more plants
BSAI Halibut Catcher Vessel Participation	2008-13 annual avg. =	1.0 – 4.9 vessels	5.0 – 9.9 vessels	10.0 or more vessels
BSAI Halibut Shore-Based Processing Participation	2008-13 annual avg. =	0.5 – 0.9 plants	1.0 – 1.9 plants	2.0 or more plants

Outside of Alaska, substantial engagement in the BSAI groundfish fisheries is highly concentrated in the Seattle Metropolitan Statistical Area (Seattle MSA), with a secondary concentration in the BSAI groundfish trawl catcher vessel fleet in Newport, Oregon. The Seattle MSA is the community most substantially engaged in the BSAI groundfish fishery, but is among the least substantially dependent on those fisheries, of the engaged communities. While community-level dependence is not a salient issue for the Seattle MSA or Newport, potential adverse impacts of some of the Alternative 2 options and

suboptions would be profound in terms of potential loss of revenues to individual operations and sectors and potential loss of income and/or employment to relatively large numbers of individuals. Given the type of high and adverse impacts that may accrue to some sectors within the Seattle MSA, environmental justice issues may be of concern as well, based on industry-supplied data that indicate high proportions of minority employees in the catcher processor sector[4].

Changes Since the Initial Review Draft

The following does not represent an exhaustive list, but major changes include:

- Revised **purpose and need** based on Council discussion in February 2015 (Section 1.2)
- **Revised options** based on Council's February 2015 motion, including expansion of the range of PSC reductions out to 40, 45, and 50 percent, and discussion of separate PSC limits for Amendment 80 between the cooperatives and the limited access sector (Chapter 2)
    - Staff reordered the options, discussed **implementation** of the options in the FMP and or regulations, and discussed how the Amendment 80 limited access suboption would be written in regulations (Section 2.2)
    - **Impacts** of the expanded range are included in each of the RIR impact sections (Section 4.8 through 4.12); Amendment 80 limited access specifically is in Section 4.8.2
- Additional information on **status of halibut and halibut management**, including more information on the stock assessment and estimates of spawning, exploitable, and juvenile biomass; changes in the understanding of stock status with the resolution of the retrospective bias in 2012; discussion of stock status with respect to overfishing; size at age information; discussions at the 2015 IPHC annual meeting (Sections 3.1.1 and 3.1.2)
- Additional information on **halibut PSC mortality**, including discard mortality rates (Section 3.1.3.2), summary of voluntary reductions in 2014 from industry reports in February 2015 and update on 2015 deck sorting exempted fishing permit (Section 3.1.3.6)
- Changes to the **economic model** – U26 fish now modeled explicitly, status quo is modeled using retrospective biomass values, assumptions are clearly identified (Section 4.6)
- Description of **groundfish fishery behavior changes** captured in the model, and discussion of other behavior changes that may be possible (Section 4.4.1.5 and sector impacts in Sections 4.8 through 4.12, Appendix B)
- Additional **metrics for economic analysis**: wholesale revenue per mt of halibut PSC (Section 4.4.1.4), crew impacts (Section 4.4.1.2 and sector impacts in Sections 4.8 through 4.12), CDQ ownership in groundfish fisheries (Section 4.4.6)
- Summary of **halibut fishery impacts** from reductions across all sectors, and discussion of impacts of this action on halibut fisheries coastwide (Section 4.13.1)
- **Community analysis** of halibut- and groundfish-dependency (Appendix C, Sections 4.13.1.3 and 4.13.2.3)
- Summary of **Halibut Act** and references to relevant sections for that and Magnuson-Stevens Act National Standards considerations (Chapter 6)

[4] Per CEQ guidance on environmental justice, under NEPA, the identification of a disproportionately high and adverse human health or environmental effect (including interrelated social, cultural, and economic effects) on a low-income population, minority population, or Indian tribe does not preclude a proposed agency action from going forward, nor does it necessarily compel a conclusion that a proposed action is environmentally unsatisfactory. Rather, the identification of such an effect should heighten agency attention to alternatives, mitigation strategies, monitoring needs, and preferences expressed by the affected community or population (http://www.epa.gov/environmentaljustice/resources/policy/ej_guidance_nepa_ceq1297.pdf).