Bycatch data summary

PREPARED BY: IPHC SECRETARIAT (21 DECEMBER 2017)

PURPOSE

To provide a response to the Commissioners' recommendations (AM093-Rec.09 and IM093-Req.01) for a detailed examination of changes in commercial bycatch levels among all gears and sectors by IPHC Regulatory Areas.

BACKGROUND

At the 93rd Session of the IPHC Annual Meeting (AM093) in January 2017, the Commission made a call for additional fishery statistics on bycatch as follows:

AM093–Rec.09 (para. 110) ***NOTING*** *that the Commission had previously requested the IPHC Secretariat to examine bycatch reduction by the Amendment 80 sector versus other sectors in the Bering Sea, by regulatory area (see AM92.10), which was yet to be undertaken, the Commission* ***RECOMMENDED*** *that the IPHC Secretariat undertake a detailed examination of changes in bycatch levels among all gears/sectors, and for results to be presented to the Commission at its 93rd Interim Meeting (in November 2017).*

At the 93rd Session of the IPHC Interim Meeting (IM093) in November 2017, the Commission made a further request of the IPHC Secretariat as follows:

IM093–Req.01 (para. 8) ***NOTING*** *Appendix I of paper IPHC-2017-IM093-05 Rev_1 was provided the evening prior to the Interim Meeting, and detailed information available on bycatch levels among all gears/sectors, as requested by the Commission at its 93rd Annual Meeting (AM093-Rec.09), the Commission* ***REQUESTED*** *that the IPHC Secretariat facilitate consideration of the information inter-sessionally, so that the Commission may provide further guidance on the type of information it requires, for consideration at the 94th Annual Meeting in January 2018.*

DISCUSSION

Appendix I details trends in bycatch by sector and IPHC Regulatory Area in the Bering Sea and Aleutian Islands.

IPHC Circular 2017-21 was communicated to the Commission on 05 December 2017 calling for additional feedback on the bycatch information presented to the IM093. Feedback was received requesting similar data on bycatch would be desirable from the Canadian fleets.

Appendix II details trends in bycatch by sector in IPHC Regulatory Area 2B (Canada).

RECOMMENDATION/S

That the Commission:

1) **NOTE** paper IPHC-2018-AM094-INF03 which provides a response to the Commissioners' recommendations (AM093-Rec.09 and IM093-Req.01) for a detailed examination of changes in commercial bycatch levels among all gears and sectors by IPHC Regulatory Areas.

APPENDICES

Appendix I: Commercial Bycatch in the Bering Sea (U.S.A.).

Appendix II: Bycatch by sector in IPHC Regulatory Area 2B (Canada).

Appendix I

COMMERCIAL BYCATCH IN THE BERING SEA

AM093–Rec.09 (para. 110)	***Exempted Fishing Permit (EFP) updates*** **NOTING** that the Commission had previously requested the IPHC Secretariat to examine bycatch reduction by the Amendment 80 sector versus other sectors in the Bering Sea, by regulatory area (see AM92.10), which was yet to be undertaken, the Commission **RECOMMENDED** that the IPHC Secretariat undertake a detailed examination of changes in bycatch levels among all gears/sectors, and for results to be presented to the Commission at its 93rd Interim Meeting (in November 2017).

The information provided in this Appendix shows trends in bycatch by sector and IPHC Regulatory Area in the Bering Sea and Aleutian Islands.

The IPHC defines bycatch as follows: *Incidentally caught fish by fisheries targeting other species and that cannot legally be retained. Bycatch mortality, or bycatch removals, refers only to those fish that subsequently die due to capture.*

Bycatch of Pacific halibut has been an ongoing management issue since the 1960s. For perspective, the trend in total removals of Pacific halibut, including bycatch, coastwide for all IPHC Regulatory Areas is shown in Figure 1.

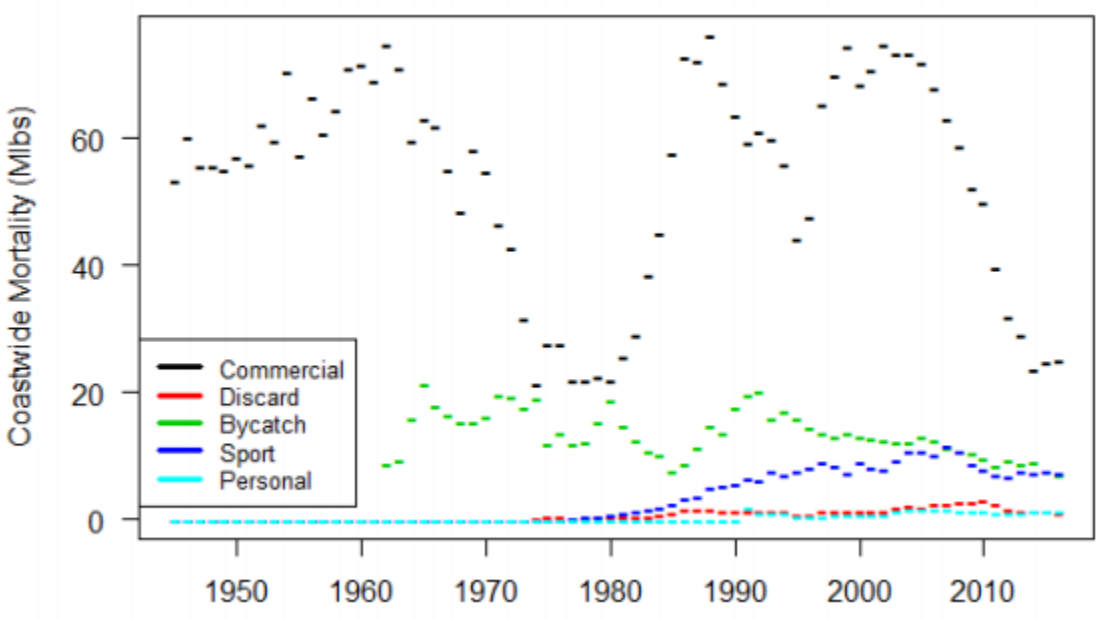

Figure 1. Trend in Pacific halibut total removals coastwide (millions of lbs). Commercial is the directed longline fishery, Discard is the discard mortality from the directed commercial fishery, Bycatch is mortality from non-directed fisheries, Sport (Recreational) is guided and unguided recreational fisheries, and Personal is personal use and subsistence. *(Source: Abundance-based Management (ABM) discussion paper, Figure 2, p.8 (see references))*

ESTIMATING BYCATCH

Bycatch of Pacific halibut is estimated because not all fisheries have 100% monitoring and not all Pacific halibut that are discarded are assumed to die. Agencies estimate the amount of bycatch that will not survive, called discard mortality.

The 2016 Report on Assessment and Research Activities (RARA) (Chapter 2.6) provides previous sources of bycatch information, as well as the estimated bycatch mortality by Regulatory Area. For Alaska, NMFS Alaska Region provides the bycatch estimates by fishery for most fisheries. The Alaska Department of Fish and Game (ADFG) provides estimates of Pacific halibut bycatch in scallop dredge and crab fisheries, although not every year. Several fishery programs have a mandatory 100% monitoring requirement, including the Bering Sea Aleutian Islands (BSAI) community Development Quota (CDQ) fisheries, the American Fisheries Act (AFA) pollock cooperatives, and the BSAI Amendment 80 (A80) fishery cooperatives. The NMFS Alaska Fisheries Science Center provides an annual deployment plan with scientific guidelines on the amount of coverage and the selection criteria for vessels without 100% monitoring, including vessels in the directed Pacific halibut individual fishing quota fishery.

Further information on discard mortality rates (DMRs) and estimating bycatch can be found in the 2016 RARA (Chapter 2.6, p.73), the ABM discussion paper, and Amendment 111 to the BSAI Groundfish Fishery Management Plan (AM 111)(p.78 – 79).

AREA EXAMINED – BERING SEA AND ALEUTIAN ISLANDS

The area of focus for this paper is the Bering Sea and Aleutian Islands. The Bering Sea is north of Alaska's Aleutian Island chain and south of Alaska's western mainland. The Bering Sea and Aleutian Islands includes IPHC's Regulatory Areas 4A, 4B, 4C, 4D, 4E, and the IPHC Closed Area.

DESCRIPTION OF COMMERCIAL FISHERIES WITH BYCATCH

In the Bering Sea and Aleutian Islands, several commercial fisheries, or sectors, have bycatch of Pacific halibut to varying degrees, including trawl (midwater/pelagic and bottom trawl), hook and line, pot (or trap), and dredge fisheries. For this examination, the BSAI fisheries are grouped as follows:

- Groundfish Trawl
- Hook & Line (non-IFQ)
- Hook & Line (IFQ)
- Groundfish Pot
- Scallop Dredge
- Crab Pot

Four fisheries that catch Pacific halibut as bycatch in the Bering Sea and Aleutian Islands are restricted by what the NPFMC has termed PSC limits. They are the Amendment 80 cooperatives, the BSAI trawl limited access fisheries, the Pacific cod longline fisheries (catcher/processors and catcher vessels), and the CDQ fisheries. Within the IPHC reported categories of commercial fisheries, the fisheries with PSC limits (defined in regulation at 50 CFR §679.21) (listed in the right side of the table) are:

BSAI commercial fishery categories	PSC limited fisheries
Groundfish Trawl	• Am80 cooperatives • BSAI trawl limited access – Yellowfin sole – Rockfish – Pacific cod – Pollock, atka mackerel, other • CDQ (trawl)
Hook & Line (non-IFQ)	• longline fishery – Pacific cod o Catcher/processors o Catcher vessels – Other fisheries
Hook & Line (IFQ)	• CDQ (non-trawl)
Groundfish Pot	
Scallop Dredge	
Crab Pot	

The four fishery sectors in the BSAI with Pacific halibut PSC limits are described further below. Much of these descriptions are excerpted from the ABM discussion paper, pages 15-18.

- **Amendment 80 cooperatives (trawl) –**
  Trawl catcher/processors in the BSAI active in groundfish fisheries other than Bering Sea pollock (i.e., the head-and-gut fleet or Amendment 80 vessels). The Amendment 80 species are the following six species: BSAI Atka mackerel, Aleutian Islands Pacific ocean perch, BSAI flathead sole, BSAI Pacific cod, BSAI rock sole, and BSAI yellowfin sole (§ 679.2). The Amendment 80 sector can be divided between vessels that focus primarily on flatfish (i.e., Alaska plaice, arrowtooth flounder, flathead sole, rock sole, and yellowfin sole) and those vessels that focus on Atka mackerel. The flatfish-focused vessels have higher rates of halibut bycatch than the Atka mackerel vessels. The Amendment 80 cooperatives include the Alaska Seafood Cooperative (AKSC) and the Alaska Groundfish Cooperative (AGC).

- **Bering Sea Aleutian Island (BSAI) trawl limited access (TLA) fisheries -** *The BSAI trawl limited access sector comprises all the trawl vessels in the BSAI except Amendment 80 catcher/processors. This includes both pelagic and non-pelagic (bottom) trawls. Pelagic trawl generally targets pollock. NMFS apportions this sector's PSC limit into PSC allowances (some have seasonal releases) among the following trawl fishery categories: 1) yellowfin sole fishery, 2) rock sole/flathead sole/"other flatfish" fishery, 3) Greenland turbot/arrowtooth flounder/Kamchatka flounder/sablefish fishery, 4) rockfish fishery, 5) Pacific cod fishery, and 6) pollock/Atka mackerel/"other species" fishery, which includes the midwater pollock fishery. This sector includes the following cooperatives: Pollock Conservation Cooperative, and United Catcher Boast and Midwater Trawlers Association.*

- **Longline fisheries (also called BSAI Non-trawl) –**
  The BSAI non-trawl sector comprises all the non-trawl vessels in the BSAI except vessels fishing for groundfish in the community development quota (CDQ) sector. However, the Council and NMFS have exempted pot gear, jig gear, and the sablefish IFQ hook-and-line gear fishery categories from halibut PSC limits. Therefore, only the hook-and-line catcher/processor vessels (primarily targeting Pacific cod and to a lesser extent Greenland turbot) and hook-and-line catcher vessels (exclusively targeting Pacific cod) are subject to PSC limits. All but one hook-and-line catcher/processor fishing in the BSAI participates in a voluntary cooperative, the Freezer Longline Conservation Cooperative (FLCC). The FLCC has allowed hook-and-line catcher/processors to fish as a coordinated group and has allowed less efficient vessels to decrease fishing or stop entirely.

- **Community Development Quota (CDQ) fisheries –**
  The CDQ sector includes all trawl and non-trawl vessels that harvest groundfish under the CDQ Program. CDQ vessels primarily target pollock using trawl gear and target Pacific cod using hook-and-line gear. Other species such as yellowfin sole, several flatfish species, Atka mackerel and Pacific ocean perch allocated to the CDQ sector are targeted by vessels using trawl gear.

The Pacific halibut PSC limits among these four fishery sectors was implemented through AM 111. AM 111 further reduced PSC limits for these sectors as follows (adapted from ABM discussion paper, p.15):

	Previous PSC limit (mt)	PSC limit reduction	Current PSC limit (mt)
Am 80 cooperatives	2,325	-25%	1,745
BSAI trawl limited access fisheries	875	-15%	745
Longline fisheries	833	-15%	710
CDQ fisheries	393	-20%	315
TOTAL	4,426	-21%	3,515

The ABM discussion paper included the table below showing the trends from 2008-2016 in percent attainment of the PSC limit by fishery compared to Pacific halibut mortality estimates for each fishery (ABM discussion paper, p.19). The table shows that, in general, most fisheries have remained well below their PSC limits. In 2012, the BSAI trawl limited access fishery exceeded its PSC limit.

Table 4. Pacific halibut mortality estimates (top rows) and mortality relative to the limits (bottom rows) by sector for 2008-2016.

	Am80	BSAI TLA	Longline fisheries	CDQ	Total PSC mortality
2008	1,869	838	593	215	3,515
2009	1,985	815	597	155	3,552
2010	2,154	584	526	162	3,426
2011	1,722	717	498	243	3,179
2012	1,890	1,012	570	272	3,744
2013	2,089	784	471	266	3,611
2014	2,106	717	408	247	3,478
2015	1,362	527	299	130	2,318
2016	1,333	650	197	174	2,354
2017*	699	524	124	92	1,439
	Am80	BSAI TLA	Longline fisheries	CDQ	% of Total PSC limit
2008	74%	96%	71%	63%	77%
2009	80%	93%	72%	45%	78%
2010	89%	67%	63%	41%	76%
2011	72%	82%	60%	62%	71%
2012	81%	116%	68%	69%	85%
2013	90%	90%	57%	68%	82%
2014	91%	82%	49%	63%	79%
2015	59%	60%	36%	33%	52%
2016	76%	87%	28%	55%	67%
2017*	40%	70%	17%	29%	41%

* Halibut mortality to date week of 8/14/2017

TRENDS IN BYCATCH BY SECTOR AND IPHC REGULATORY AREA

The IPHC reports Pacific halibut bycatch mortality from commercial fisheries by year, sector, and IPHC Regulatory Area in the RARA. The table below provides the bycatch mortality in the BSAI from 2007-2017.

IPHC Reg Area and Gear	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
AREA 4A											
Scallop Dredge	0	0	0	0	0	0	0	0	0	0	0
Crab Pot	2	7	5	22	14	12	27	0	0	0	0
Groundfish Trawl	1,418	1,021	1,315	800	789	1,314	606	615	483	466	288
Hook & Line (non-IFQ)	153	178	220	213	145	130	204	160	149	99	104
Hook & Line (IFQ)	15	15	15	15	15	5	4	3	3	2	2
Groundfish Pot	3	8	2	7	8	10	32	27	7	5	7
Total	1,591	1,229	1,557	1,058	971	1,472	873	805	642	572	400
AREA 4B											
Crab Pot	2	2	0	0	1	0	3	0	0	0	0
Groundfish Trawl	293	206	299	371	402	215	116	101	202	137	175
Hook & Line (non-IFQ)	139	114	119	65	32	27	6	24	20	5	18
Hook & Line (IFQ)	40	40	40	40	40	12	10	5	2	2	0
Groundfish Pot	3	2	1	1	1	1	5	2	0	0	2
Total	477	364	459	477	476	255	140	132	223	144	195
AREA 4CDE+CL											
Scallop Dredge	0	0	0	0	0	0	0	0	0	0	0
Crab Pot	43	54	33	63	49	29	29	0	37	37	37
Groundfish Trawl	4,145	3,469	3,160	3,429	2,496	3,458	4,110	4,205	3,003	2,895	2,427
Hook & Line (non-IFQ)	609	978	821	684	472	768	668	538	384	311	281
Hook & Line (IFQ)	5	5	5	5	5	1	151	11	0	0	0
Groundfish Pot	1	2	1	1	2	4	18	13	2	2	2
Total	4,804	4,508	4,021	4,182	3,024	4,260	4,977	4,767	3,425	3,245	2,747
AREA 4 Subtotal											
Scallop Dredge	0	0	1	0	0	0	0	0	0	0	0
Crab Pot	48	63	39	85	65	41	59	0	37	37	37
Groundfish Trawl	5,856	4,696	4,774	4,600	3,687	4,987	4,832	4,921	3,687	3,499	2,890
Hook & Line (non-IFQ)	901	1,270	1,160	962	649	925	878	722	552	415	403
Hook & Line (IFQ)	60	60	60	60	60	18	165	19	5	3	2
Groundfish Pot	7	12	4	9	11	15	55	42	8	7	10
Total	6,872	6,101	6,037	5,717	4,472	5,987	5,989	5,704	4,290	3,961	3,342

Figure 9 from the 2016 RARA, Chapter 2.6, shows the Pacific halibut bycatch mortality for all of Area 4 by gear type from 2007-2016.

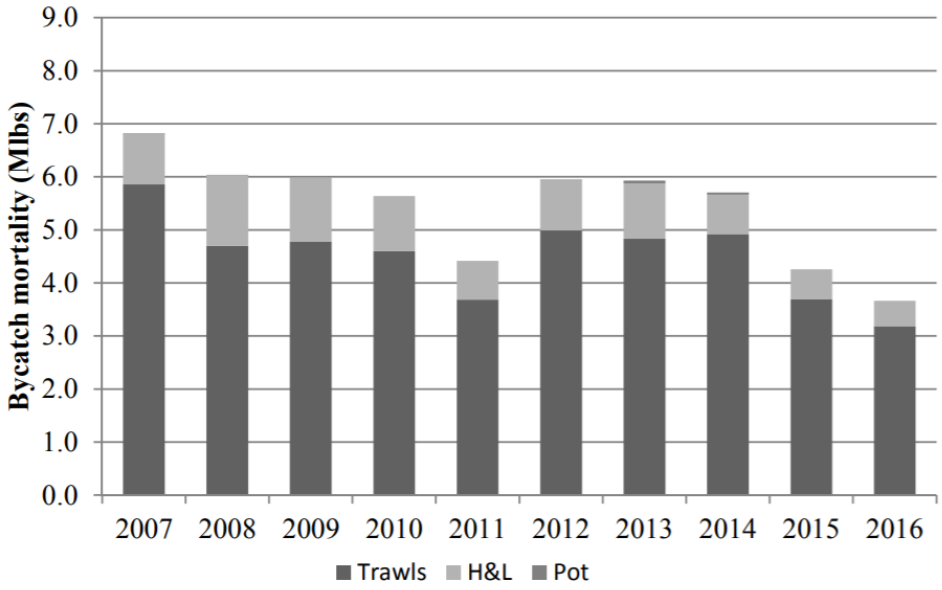

Figure 9. Bycatch mortality (millions of pounds, net weight) in Area 4 by gear type during 2007-2016.

Figure 10 from the 2016 RARA, Chapter 2.6, shows the Pacific halibut bycatch mortality for all gears by IPHC Regulatory Area (Area 4A, 4B, and 4CDE plus the Closed Area combined) from 2007-2016.

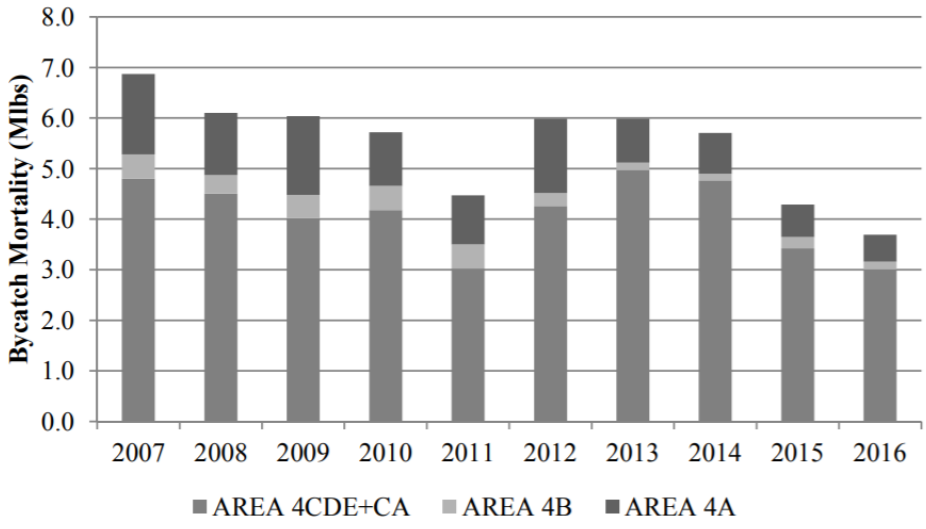

Figure 10. Bycatch mortality among the Bering Sea IPHC regulatory areas since 2007. ("CA" = Closed Area)

In addition to the information available from the IPHC, the North Pacific Fishery Management Council's (NPFMC) ABM working group has produced an ABM discussion paper that provides bycatch mortality for Area 4 combined for PSC-limited fisheries. Figures 12 and 13 from the ABM discussion paper show the trawl fleet had a steady decline in Pacific halibut CPUE in both number and weight. Figure 15 shows the non-IFQ groundfish longline fleet decline in Pacific halibut CPUE (weight) in recent years.

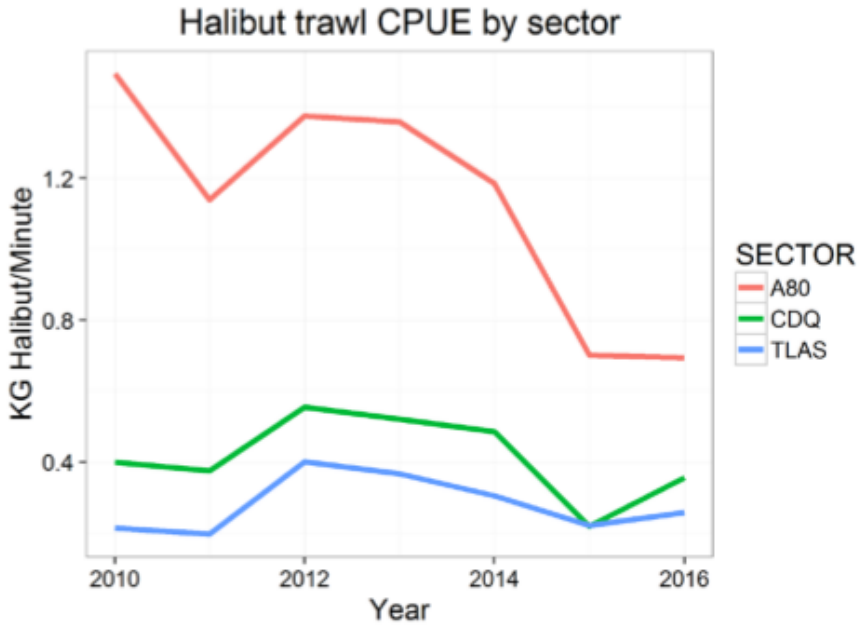

Figure 12. Catch per unit effort (weight) of halibut by trawl sector from 2010-2016.

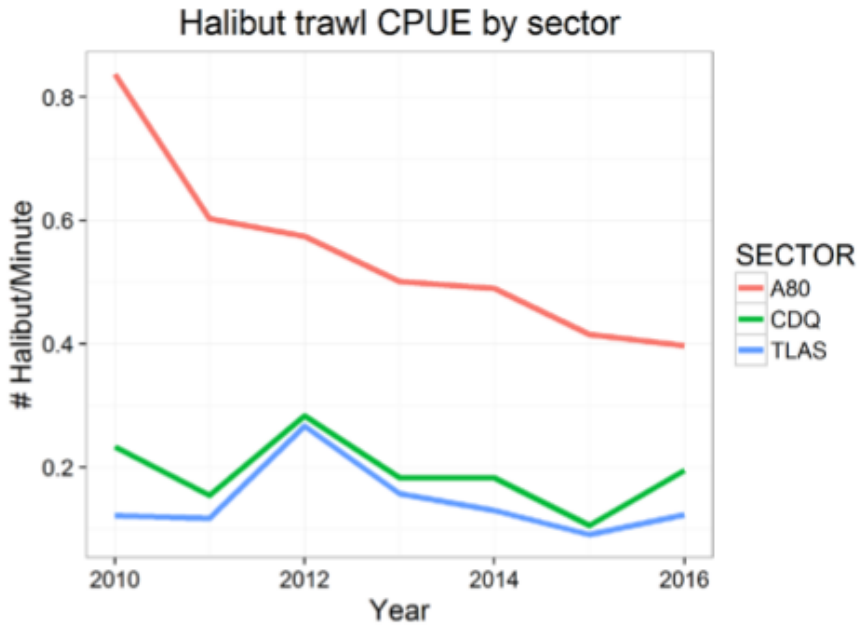

Figure 13. Catch per unit effort (numbers) halibut by trawl sector from 2010-2016.

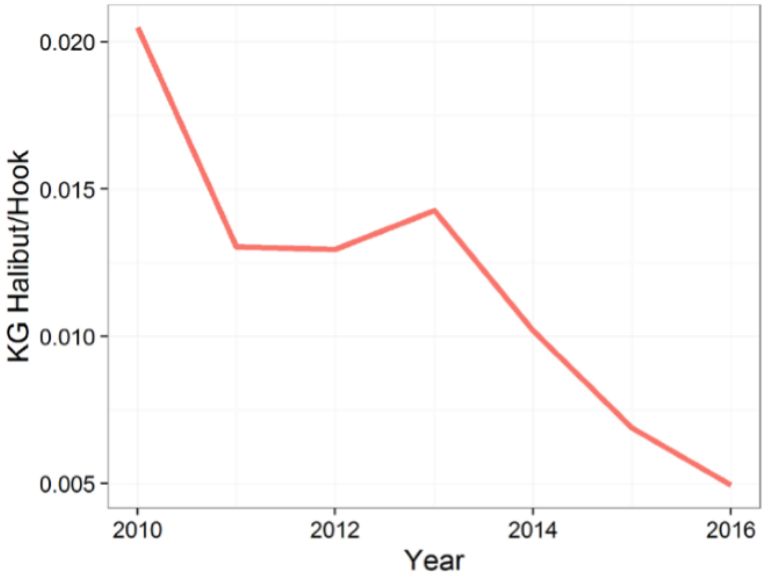

Figure 15. Catch per unit effort (weight) of halibut for longline gear (non-IFQ) in the EBS from 2010 – 2016.

An additional view of the data below, from NMFS inseason management report (see references) to the NPFMC at their December 2016 meeting, shows the reduction in halibut mortality by PSC limited fisheries in 2016 compared to the previous 5-year average (2011-2015) in the BSAI.

B2 NMFS BSAI Inseason Mgt Report
DECEMBER 2016

2016 BSAI Reduction in Halibut Mortality Compared to 5 year Average

Sector	2011-2015 Average (mt)	2016 (mt)	% Change (mt)	2011-2015 Rate*	2016 Rate*	% Change (Rate)
Hook-and-line						
Catcher/Processors	437	181	-59%	3.20	1.37	-57%
Catcher Vessels	3	0	-100%	2.68	1.33	-50%
Total	439	181	-59%	3.20	1.37	-57%
Non-Pelagic Trawl						
Amendment 80 Catcher/Processors	1,946	1,327	-32%	6.00	4.33	-28%
AFA Catcher/Processors	123	109	-11%	3.96	5.29	34%
Catcher Vessels	349	410	18%	6.19	6.64	7%
Total	2,418	1,846	-24%	5.87	4.75	-19%
Pelagic Trawl						
AFA Catcher/Processors	133	64	-52%	0.30	0.13	-55%
AFA Catcher Vessels	80	19	-76%	0.12	0.03	-78%
Total	214	83	-61%	0.19	0.07	-63%
CDQ						
Hook-and-line Vessels	49	23	-52%	2.30	1.26	-45%
Non-pelagic Trawl Vessels	163	113	-31%	4.47	2.83	-37%
Pelagic Trawl Vessels	18	9	-52%	0.14	0.06	-56%
Total	230	145	-37%	1.25	0.74	-41%
** Rate is kg of halibut / mt of groundfish* **TOTAL**	**3,301**	**2,255**	**-32%**	**1.79**	**1.19**	**-34%**

REFERENCES

IPHC's Report of the 93rd Session of the IPHC Annual Meeting (AM093), 2017. IPHC–2017–AM093–R.
http://www.iphc.int/meetings/2017am/IPHC-2017-AM093-R-Report_of_the_AM093.pdf

IPHC's Assessment of the Pacific halibut stock at the end of 2016 (I. Stewart and D. Wilson), Presentation from the 93rd Annual Meeting, January 2017. IPHC-2017-AM093-07
http://www.iphc.int/meetings-and-events/annual-meeting/documents.html

IPHC's Report of Assessment and Research Activities. 2016. Chapter 2.6 Incidental catch and mortality of Pacific halibut, 1990-2016. Claude Dykstra. p.71-89.
http://www.iphc.int/publications/rara/2016/IPHC-2016-RARA-26-R-2.6_Incidental_catch_of_halibut.pdf

NMFS's Bering Sea/Aleutian Islands Halibut Prohibited Species Catch Limits, Environmental Assessment/ Regulatory Impact Review/Initial Regulatory Flexibility Analysis for Amendment 111 to the Fishery Management Plan for Groundfish of the Bering Sea/Aleutian Islands Management Area. January 2016.
https://alaskafisheries.noaa.gov/sites/default/files/analyses/finalbsai111earirirfa0116.pdf

NMFS's BSAI inseason management report, Agenda Item B2 at NPFMC December 2016 meeting.
http://legistar2.granicus.com/npfmc/meetings/2016/12/950_A_North_Pacific_Council_16-12-06_Meeting_Agenda.pdf

NPFMC's October 2017 meeting, Agenda Item C9. Halibut Abundance-based PSC Limits - Discussion paper. C9 Halibut ABM Discussion Paper 9-8-17.
http://legistar2.granicus.com/npfmc/meetings/2017/10/965_A_North_Pacific_Council_17-10-02_Meeting_Agenda.pdf

NPFMC's Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area. October 2017.
https://www.npfmc.org/wp-content/PDFdocuments/fmp/BSAI/BSAIfmp.pdf

Appendix II

BYCATCH IN REGULATORY AREA 2B (CANADA)

The information provided in this Appendix shows trends in bycatch mortality by sector for IPHC Regulatory Area 2B in British Columbia, Canada.

The IPHC defines bycatch as follows: *Incidentally caught fish by fisheries targeting other species and that cannot legally be retained. Bycatch mortality, or bycatch removals, refers only to those fish that subsequently die due to capture.*

Bycatch of Pacific halibut has been an ongoing management issue since the 1960s. For perspective, the trend in total removals of Pacific halibut, including bycatch, coastwide for all IPHC Regulatory Areas is shown in Figure 1.

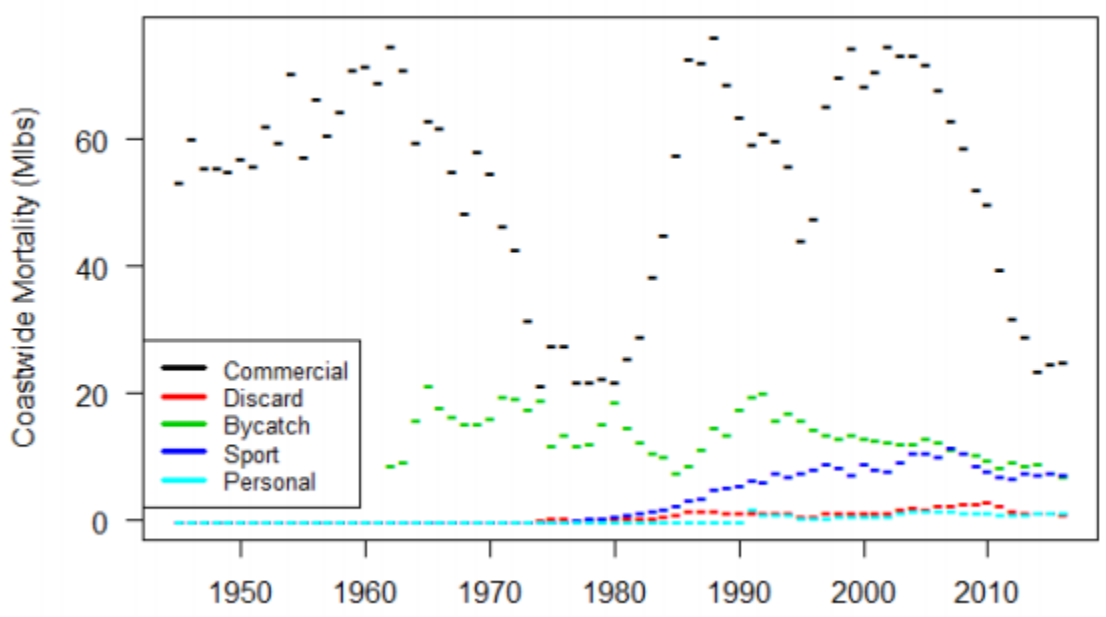

Figure 1. Trend in Pacific halibut total removals coastwide (millions of lbs). Commercial is the directed longline fishery, Discard is the discard mortality from the directed commercial fishery, Bycatch is mortality from non-directed fisheries, Sport (Recreational) is guided and unguided recreational fisheries, and Personal is personal use and subsistence. *(Source: Abundance-based Management (ABM) discussion paper, Figure 2, p.8 (see references))*

ESTIMATING BYCATCH

Bycatch of Pacific halibut is estimated because not all fisheries have 100% monitoring and not all Pacific halibut that are discarded are assumed to die. Agencies estimate the amount of bycatch that will not survive, called discard mortality.

The IPHC's Fisheries Statistics paper (IPHC-2018-AM094-05) for IPHC's Annual Meeting provides sources of bycatch information, as well as the estimated bycatch mortality by Regulatory Area. For British Columbia, the amount of information varies by fishery. Trawl groundfish fisheries are comprehensively monitored and bycatch information is provided to IPHC by DFO. Bycatch in the trawl groundfish fishery is managed with an individual bycatch quota program implemented by DFO in 1996. Fishery observers sample the catch on each bottom trawler, collecting data to estimate bycatch and discard mortality. Bycatch in other fisheries, such as the shrimp trawl, sablefish pot, and rockfish hook-and-line fisheries, was largely unknown until the inception of the Integrated Fisheries Management Program in 2006. The program has requirements for full accounting and accountability of all bycatch, and includes 100% at-sea monitoring, either by human observers or electronic monitoring. Estimates of trawl bycatch were provided by DFO staff at the Pacific Biological Station, based on data collected by observers. Reporting of bycatch from the non-trawl programs is being developed with DFO staff and will be provided in future reports.

In IPHC Regulatory Areas 2B, observers deployed on the bottom trawl vessels examine each Pacific halibut to determine release viability. The bycatch mortality reported to IPHC incorporates these release viability observations.

DESCRIPTION OF COMMERCIAL FISHERIES WITH BYCATCH

In waters off British Columbia, several commercial fisheries, or sectors, have bycatch of Pacific halibut to varying degrees according to the IPHC's definition of bycatch, including trawl groundfish fisheries, salmon troll, shrimp trawl. Canadian Integrated Fisheries Management allows licensed vessels in the quota fishery to harvest a suite of species. For example, a vessel fishing for sablefish with a category K "Sablefish" licence, may land their halibut catch. Furthermore, if legal-sized halibut is discarded, it counts towards the available halibut quota via a deduction of discard mortality (average weight multiplied by gear-specific discard mortality rate). However, this discarded amount is not tracked as bycatch mortality.

Some of what IPHC considers bycatch (Pacific halibut caught in non-halibut fisheries and discarded at sea) may be reported as landed catch for IPHC Regulatory Area 2B. IPHC and DFO staff are coordinating on better defining and reporting Pacific halibut discard mortality (whether as bycatch or incidental mortality to commercial fisheries) for IPHC's catch accounting purposes.

In Canada, Pacific halibut bycatch in trawl fisheries are capped at 750,000 pounds net weight (453.6 t round weight) by DFO. Non-trawl bycatch is handled under an IFQ system within the directed Pacific halibut fishery cap.

TRENDS IN BYCATCH BY SECTOR FOR IPHC REGULATORY AREA 2B

The IPHC reports Pacific halibut bycatch mortality from commercial fisheries by year, sector, and IPHC Regulatory Area in the Annual Meeting Fisheries Statistics paper (IPHC-2018-AM094-

05) and prior to that in the IPHC's Report of Assessment and Research Activities (RARA). For 2017, bycatch mortality in the BC bottom trawl fishery was estimated at 251,000 pounds (113.9 t). The reported bycatch mortality data were complete through September. Projections for the full calendar year 2017 were made by extrapolating to the full 12 months. The table below provides the bycatch mortality in Regulatory Area 2B from 2008-17.

IPHC Reg Area and Gear	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
AREA 2B										
Groundfish Bottom Trawl	143	213	181	232	189	225	245	326	271	251
Total	143	213	181	232	189	225	245	326	271	251

Figure 3 from the 2016 RARA (IPHC-2016-RARA26-R), Chapter 2.6, shows the Pacific halibut bycatch mortality by IPHC Regulatory Area region from 1990-2016. The figure shows Regulatory Area 2 bycatch is proportionally smaller than Areas 3 or 4.

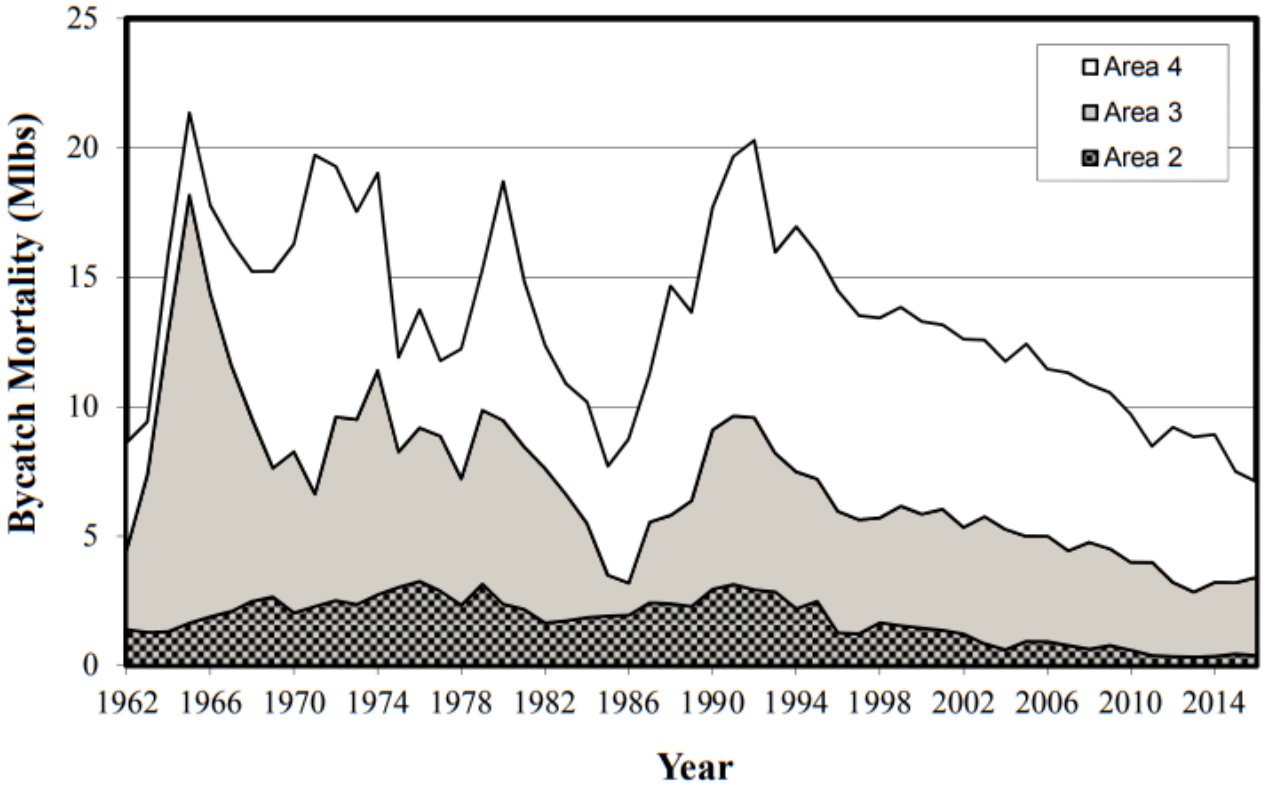

Figure 3. Bycatch mortality estimates of Pacific halibut by IPHC regulatory area (millions of pounds, net weight), 1990-2016.

Figure 5 from the 2016 RARA (IPHC-2016-RARA26-R), Chapter 2.6, shows the Pacific halibut bycatch mortality by calendar quarter for IPHC Regulatory Area 2B from 2007-16.

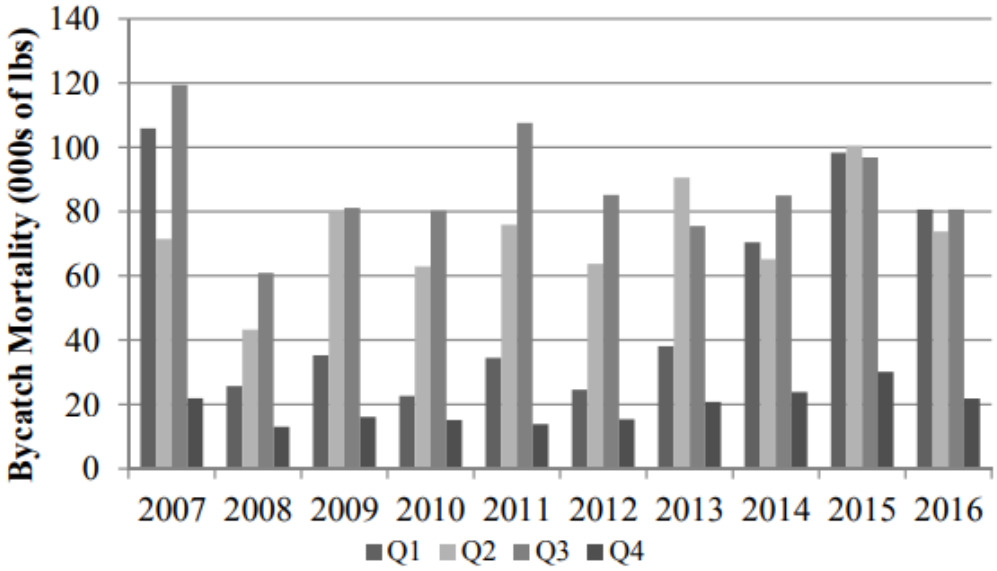

Figure 5. Pacific halibut bycatch mortality (thousands of pounds, net weight) by calendar quarter in the 2007-2016 Area 2B (BC) bottom trawl groundfish fishery.

Figure 6 from the 2016 RARA (IPHC-2016-RARA26-R), Chapter 2.6, shows the Pacific halibut bycatch mortality by gear type from 2007-2016 in Regulatory Area 2B.

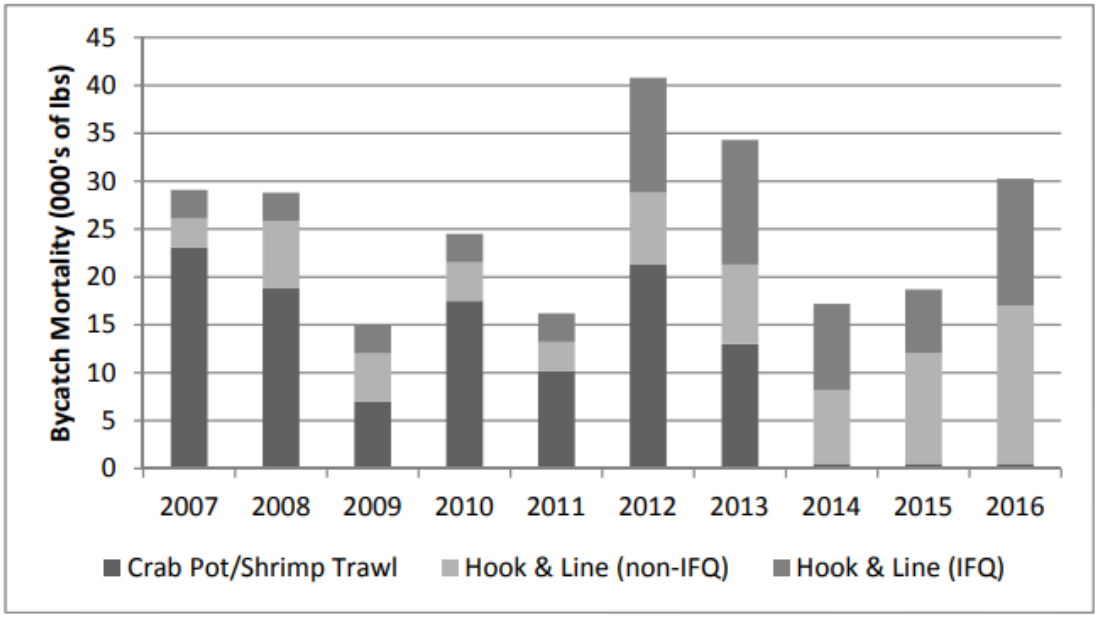

Figure 6. Pacific halibut bycatch mortality (thousands of pounds, net weight) in IPHC Area 2B during 2007-2016 by gear.

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