

Incidental catch and mortality of Pacific halibut, 1962-2008

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Abstract

Estimates of the bycatch mortality of Pacific halibut (*Hippoglossus stenolepis*) in 2008 totaled 10.7 million pounds (net weight), a decrease of 12% from 2007 and the lowest seen since 1986. Significant decreases occurred in Areas 2B and 4. Most of the decrease is attributable to lower bycatch in the Alaskan groundfish fishery. In Area 2A, bycatch mortality decreased 23% from 2006, despite only a minor decrease in trawl effort (hours). Bycatch mortality in Area 2B remained slightly higher than in 2003-4. Lower trawl bycatch in Area 4 was the primary reason for reduced bycatch mortality in that area.

Introduction

Fisheries targeting on other fish and shellfish inadvertently catch Pacific halibut (*Hippoglossus stenolepis*). Information collected by at-sea observers has indicated the incidental catch, or bycatch, is substantial. Regulations require that halibut be returned to the sea with no additional injury. However, some fish do die from being caught and handled. The preliminary estimate of bycatch mortality in 2008 is 10.7 million pounds. This is a decrease from 2007 and the lowest seen since 1986. This document provides an overview of areas and fisheries which contributed to halibut bycatch mortality in 2008.

Sources of bycatch information and estimates

The International Pacific Halibut Commission (IPHC) relies upon information supplied by observer programs for bycatch estimates in most fisheries. Research survey information is used to generate estimates of bycatch in the few cases where fishery observations are unavailable. The U.S. National Marine Fisheries Service (NMFS) operates observer programs covering the groundfish fisheries off Alaska and the U.S. west coast, and provides IPHC with estimates of bycatch. Estimates of bycatch off Alaska for 2008 were based on bycatch reported from fishing conducted through early to mid-November and projections for the remainder of the year.

Estimates of bycatch mortality in crab pot and shrimp trawl fisheries off Alaska have been made by IPHC staff from previous studies of these fisheries and are based on bycatch rates observed on research surveys because direct fishery observations of bycatch are lacking.

The amount of information varies for fisheries conducted off British Columbia. For the trawl fishery, bycatch is managed with an individual bycatch quota program instituted in 1996 by the Canadian Department of Fisheries and Oceans (DFO). Fishery observers sample the catch on each bottom trawler, collecting data to estimate bycatch. Bycatch in other fisheries, such as the shrimp trawl, sablefish pot, and rockfish hook-&-line fisheries, is largely unknown but is believed to be relatively low, particularly for the shrimp trawl fishery (Boutillier et al. 1999). A new management program in 2006, which included 100% at-sea monitoring (observers or video), required groundfish vessels to account for their bycatch of all non-target species, and will likely provide new information on halibut bycatch levels in many fisheries where little is known.

Halibut bycatch in the domestic groundfish trawl fishery operating in Area 2A is estimated from information collected by at-sea observers. Bycatch rates (number per hour) are derived from the observer data, and applied to commercial fishery effort from logbooks (Wallace and Methot 2001). The most recent estimates have been provided by Wallace and Hastie (2008). Shrimp trawl fishery bycatch estimates are provided by Oregon Department of Fish and Wildlife (ODFW) staff from examinations of halibut bycatch during gear experiments. The estimates are considered rough approximations given the limited amount of data available, but appear reasonable and are updated every few years. Bycatch in the hook-&-line fishery has been determined through comparisons with the Alaskan sablefish fishery (Williams et al. 1998).

Discard mortality rates and assumptions

Discard mortality rates (DMRs), used to determine the fraction of the estimated bycatch that dies, vary by fishery and area. Where observers are used for fishery sampling, DMRs are calculated from data collected on the release viability or injury of halibut. For areas without observers, assumed DMRs are used, which are based on the similarity of fisheries to those in other areas where data are available. The mortality models used to calculate these rates have been presented by Clark et al. (1992) and Williams (1997).

Observer data are used to estimate DMRs in fisheries in two major areas. NMFS manages the groundfish fisheries off Alaska according to a schedule of DMRs recommended by the IPHC; the 2008 schedule is summarized in Table 1. DMRs for previous years can be found in Williams (this volume). In Area 2A, NMFS observers have been collecting release condition data on bottom trawlers for several years. These data were used to estimate mortality in 2008. In Area 2B, observers monitoring the Canadian trawl fishery examine each halibut to determine release viability.

Data to determine DMRs for other fisheries are not available, so assumptions are made on likely DMRs based on similar fisheries where DMRs are known. For Area 2A, the unobserved hook-&-line fishery for sablefish is assigned an assumed DMR of 25%. The midwater fishery for whiting is assumed to have a 75% DMR, based on the large catches of whiting typical of this type of fishery.

Bycatch mortality by regulatory area

Halibut bycatch mortality was relatively small until the 1960s, when it increased rapidly due to the sudden development of the foreign trawl fisheries off the North American coast. The total bycatch mortality (excluding the Japanese directed fishery in the eastern and western Bering Sea) peaked in 1965 at about 21 million pounds (Fig. 1). Bycatch mortality declined during the late 1960s, but increased to about 20 million pounds in the early 1970s. During the late 1970s and early 1980s, it dropped to roughly 13 million pounds, as foreign fishing off Alaska came under increasing control. By 1985, bycatch mortality had declined to 7.2 million pounds, the lowest level since the IPHC began its monitoring nearly 25 years earlier. Bycatch mortality increased in the late 1980s, due to the growth of the U.S. groundfish fishery off Alaska, and peaked at 20.3 million pounds in 1992. Bycatch mortality has since declined; preliminary estimates for 2008 total 10.7 million pounds, representing a 12.4% decrease from 2007 and a 47% decrease from the peak in 1992 of 20.3 million pounds. Bycatch mortality has ranged between 12-14 million pounds since the late 1990s, and 2008 is the first significant drop below that range.

Estimates of bycatch mortality by fishery and major IPHC regulatory area for 1999 through 2008 are shown in Table 2 and discussed in the following sections. Tables 3 through 5 provide bycatch mortality estimates by various area groupings. Tables 6 and 7 provide estimates of bycatch mortality in the federally-managed Alaskan groundfish fisheries.

Area 2

Bycatch mortality in Area 2 in 2008 was estimated at 0.77 million pounds, down from 2007 and well below the 10-year average of 1.14 million pounds (Table 2). The primary sources for bycatch mortality in Area 2 are the groundfish trawl fisheries in 2A and 2B, and the crab pot and shrimp trawl fisheries in Area 2C.

NMFS estimated halibut bycatch mortality for the 2007 trawl fishery at 0.257 million pounds, a 26% decrease from 2006 which coincides with only a minor, e.g., 2%, decrease in overall trawl effort (Wallace and Hastie 2008). Total bycatch actually decreased substantially, from 0.667 to 0.350 million pounds, or 47%, from 2006 to 2007, but the mortality fraction increased (Wallace and Hastie 2008). Trawl effort was reduced 45% in depths less than 150 fm, where halibut bycatch rates are generally higher. The effect of this reduction was enhanced by the closure, for much of the year, of the northern-most shoreward areas, where halibut bycatch rates tend to be the highest on the coast. The 2007 estimate has been used for 2008, but will be replaced when an actual estimate for 2008 is obtained, probably in late 2009. Finally, no new estimate of halibut bycatch mortality is available for the shrimp trawl fishery, so the most recent estimate has been rolled forward to 2008.

For Area 2B, trawl fishery bycatch mortality was estimated at 0.13 million pounds, a decrease of almost 60% from 2007. This latest estimate is significantly below the 10-year average of 0.24 million pounds, beginning with the first year of the Individual Bycatch Quota program. DFO staff attribute this decrease to a drop in trawl effort during the summer months in response to the high fuel prices. Many vessels shifted their fishing to other months. In addition, some vessels also fished for certain species more off-bottom than hard on bottom as in the past.

In Area 2C, crab pot fishing and shrimp trawling occur in various locations and harvests have held steady over the years. Pot fishing for brown king crab (*Lithodes aequispina*) occurs in the deep waters of Chatham Strait during the winter months, and beam trawling occurs for shrimp and flounders in the inside waters of southeast Alaska. These fisheries have not been reviewed since the early 1990s, but these fisheries are small scale in nature, with low bycatch. It is assumed that mortality has been relatively stable since first examined.

Area 3

Bycatch mortality in Area 3 was estimated at 4.3 million pounds in 2008 (Table 2), an 8.7% increase from 2007. Slight decreases in trawl bycatch mortality were offset by increases in hook-&-line fishery bycatch mortality. The Rockfish Pilot Program (RPP), a study which permits a portion of the rockfish trawl fishery to operate as fishery cooperatives, continued in 2008. Vessels participating in the rockfish cooperatives were able to fish more off-bottom and at a slower pace offered by the cooperative structure. The RPP consisted of two catcher/processor (CP) cooperatives and five catcher vessel (CV) cooperatives, with each cooperative allocated its own halibut bycatch limit. The two CP coops had a total of 55 mt (91,000 lbs net) for their halibut mortality cap, while the CV coops were allocated 115 mt (190,000 lbs net). These halibut bycatch allocations were a part of the Gulf of Alaska trawl fishery bycatch limit of 2,000 mt. In other fisheries, pot effort for

cod, which has lower bycatch properties than other gears, continues to be high. Within Area 3B, trawl and hook-&-line fishery bycatch both increased from 2007. The total 2008 Area 3 bycatch mortality is slightly below the 10-year average of 4.5 million pounds.

Area 4

Bycatch mortality in Area 4 was estimated at 5.6 million pounds, a drop of 23% from 2007. Since 1999, bycatch mortality in this area has ranged from 6.7 to 7.7 million pounds annually, averaging 7.1 million pounds. This year's estimate is significantly below the long-term average. This drop is attributed to the new fishery cooperatives allowed by Amendment 80, a program recently approved by the North Pacific Fishery Management Council. As with the RPP, the Amendment 80 cooperative program structure allowed for a slower pace and greater flexibility in the progress of the bottom trawl fishery.

For 2008, a 32% decrease in trawl fishery bycatch was offset by increases in bycatch by the hook-&-line fisheries. Driven by cod fishing, bycatch by hook-&-line gear increased markedly, even with lower cod quotas, although total hook-&-line fishery bycatch was well below the bycatch limit for the sector.

References

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Table 1. Preseason assumed discard mortality rates used by NMFS for monitoring halibut bycatch mortality in 2007-2009 in the Alaskan groundfish fisheries. From Williams (2007) and Williams (this volume).

Bering Sea/Aleutians		Gulf of Alaska	
Gear/Target	Used in 2007-2009	Gear/Target	Used in 2007-2009
<i>Trawl</i>		<i>Trawl</i>	
Atka mackerel	76	Atka mackerel	60
Bottom pollock	74	Bottom pollock	59
Pacific cod	70	Pacific cod	63
Other Flatfish	74	Deepwater flatfish	53
Rockfish	76	Shallow water flatfish	71
Flathead sole	70	Rockfish	67
Pelagic pollock	88	Flathead sole	61
Rock sole	80	Pelagic pollock	76
Sablefish	75	Sablefish	65
Turbot	70	Arrowtooth fldr	69
Arrowtooth fldr	75	Rex sole	63
Yellowfin sole	80		
<i>Pot</i>		<i>Pot</i>	
Pacific cod	7	Pacific cod	16
<i>Longline</i>		<i>Longline</i>	
Pacific cod	11	Pacific cod	14
Rockfish	17	Rockfish	10
Turbot	13		

Community Development Quota Fisheries	
Gear/Target	Used in 2008
<i>Trawl</i>	
Atka mackerel	85
Bottom pollock	86
Rockfish	82
Flathead sole	87
Pelagic pollock	90
Rock sole	86
Yellowfin sole	86
<i>Pot</i>	
Sablefish	34
<i>Longline</i>	
Pacific cod	10
Turbot	4

Table 2. Estimates (thousands of pounds, *net weight*) of bycatch mortality of Pacific halibut (*Hippoglossus stenolepis*) by year, area, and fishery for 1999 through 2008. Estimates for 2008 are preliminary and subject to change as new information becomes available.

Region and Area	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
AREA 2A										
Groundfish Trawl	946	781	796	512	462	261	418	346	257	257
Shrimp Trawl	25	25	25	25	25	25	25	25	25	25
Hook & Line	16	16	16	16	16	16	16	16	16	16
Total	987	822	837	553	503	302	459	387	298	298
AREA 2B										
Domestic Trawl	193	230	177	244	244	251	346	294	319	131
Total	193	230	177	244	244	251	346	294	319	131
AREA 2C										
Crab Pot/Shrimp Trawl	303	303	303	303	303	303	303	303	303	303
Groundfish Trawl	1	0	0	0	0	0	0	0	0	0
Hook & Line (non-IFQ)	18	56	2	1	2	23	1	2	3	5
Hook & Line (IFQ)	3	3	3	3	3	3	3	3	3	3
Chatham Str. Sablefish	8	8	8	8	8	8	8	8	8	8
Clarence Str. Sablefish	25	25	25	25	25	25	25	25	25	25
Total	358	395	341	340	341	362	340	341	342	344
AREA 2 Subtotal	1,538	1,447	1,355	1,137	1,088	915	1,145	1,022	959	773
AREA 3A										
Crab Pot/Shrimp Trawl	250	250	250	250	250	250	250	250	250	250
Groundfish Trawl	2,148	2,222	2,404	1,685	2,407	3,033	2,664	2,339	2,347	2,157
Hook & Line (non-IFQ)	317	281	203	128	389	244	149	239	102	408
Hook & Line (IFQ)	119	119	119	119	119	119	119	119	119	119
Groundfish Pot	41	10	23	2	5	15	28	18	15	20
Pr Wm Sd Sablefish	10	10	10	10	10	10	10	10	10	10
Total	2,885	2,892	3,009	2,194	3,180	3,671	3,220	2,975	2,843	2,964
AREA 3B										
Crab Pot/Shrimp Trawl	50	50	50	50	50	50	50	50	50	50
Groundfish Trawl	1,184	1,194	1,320	1,508	1,341	866	862	926	795	886
Hook & Line (non-IFQ)	281	143	171	248	198	205	69	299	136	261
Hook & Line (IFQ)	116	116	116	116	116	116	116	116	116	116
Groundfish Pot	106	7	18	2	29	37	29	9	18	25
Total	1,737	1,510	1,675	1,924	1,734	1,274	1,126	1,400	1,115	1,338
AREA 3 Subtotal	4,622	4,402	4,684	4,118	4,914	4,945	4,346	4,375	3,958	4,302
AREA 4										
Crab Pot/Shrimp Trawl	300	300	300	300	300	300	300	300	300	300
Groundfish Trawl	5,972	5,379	5,322	5,591	5,589	5,499	6,454	6,269	5,841	3,980
Hook & Line (non-IFQ)	982	1,508	1,300	1,058	556	617	666	593	659	1,064
Hook & Line (IFQ)	60	60	60	60	60	60	60	60	60	60
Groundfish Pot	11	24	13	17	28	6	2	8	7	10
CDQ Trawl	187	64	57	131	187	176	128	187	309	136
CDQ Hook & Line	172	106	68	116	102	77	82	74	86	38
AREA 4 Subtotal	7,684	7,441	7,120	7,273	6,822	6,735	7,692	7,491	7,262	5,588
GRAND TOTAL	13,844	13,290	13,159	12,528	12,824	12,595	13,183	12,888	12,179	10,663

Table 3. Estimates (thousands of pounds, *net weight* and metric tons, *round weight*) of bycatch mortality of Pacific halibut (*Hippoglossus stenolepis*) from all sources by IPHC regulatory area for 1962 through 2008. Estimates for 2008 are preliminary and subject to change as new information becomes available.

Year	Thousands of Pounds, net weight				Metric tons, round weight			
	Area 2	Area 3	Area 4	Total	Area 2	Area 3	Area 4	Total
1962	1,383	3,083	4,143	8,609	834	1,860	2,499	5,192
1963	1,283	6,102	2,038	9,423	774	3,681	1,229	5,683
1964	1,310	11,639	2,965	15,914	790	7,020	1,788	9,599
1965	1,640	16,539	3,182	21,361	989	9,976	1,919	12,884
1966	1,879	12,495	3,400	17,774	1,133	7,537	2,051	10,721
1967	2,091	9,528	4,718	16,337	1,261	5,747	2,846	9,854
1968	2,478	7,053	5,685	15,216	1,495	4,254	3,429	9,178
1969	2,651	4,980	7,599	15,230	1,599	3,004	4,584	9,186
1970	2,032	6,230	8,028	16,290	1,225	3,758	4,842	9,825
1971	2,284	4,341	13,095	19,720	1,377	2,618	7,899	11,894
1972	2,506	7,099	9,675	19,280	1,512	4,282	5,836	11,629
1973	2,357	7,147	8,029	17,533	1,422	4,311	4,843	10,575
1974	2,738	8,667	7,620	19,025	1,651	5,228	4,596	11,475
1975	3,025	5,231	3,650	11,906	1,825	3,155	2,202	7,181
1976	3,249	5,938	4,564	13,751	1,960	3,582	2,753	8,294
1977	2,874	5,988	2,914	11,776	1,733	3,612	1,758	7,103
1978	2,325	4,895	5,023	12,242	1,402	2,952	3,029	7,384
1979	3,149	6,715	5,419	15,282	1,899	4,050	3,269	9,218
1980	2,368	7,099	9,235	18,702	1,428	4,282	5,570	11,280
1981	2,169	6,282	6,408	14,859	1,308	3,789	3,865	8,963
1982	1,644	5,972	4,756	12,373	992	3,602	2,869	7,463
1983	1,723	4,892	4,269	10,883	1,039	2,951	2,575	6,564
1984	1,851	3,647	4,692	10,189	1,116	2,199	2,830	6,146
1985	1,915	1,578	4,207	7,700	1,155	952	2,538	4,644
1986	1,940	1,246	5,576	8,762	1,170	752	3,363	5,285
1987	2,428	3,113	5,738	11,279	1,465	1,878	3,461	6,803
1988	2,389	3,415	8,858	14,662	1,441	2,060	5,343	8,844
1989	2,278	4,085	7,282	13,646	1,374	2,464	4,393	8,231
1990	2,943	6,159	8,580	17,682	1,775	3,715	5,175	10,665
1991	3,133	6,514	10,022	19,669	1,890	3,929	6,045	11,864
1992	2,925	6,650	10,718	20,293	1,764	4,011	6,465	12,240
1993	2,847	5,353	7,764	15,964	1,717	3,229	4,683	9,629
1994	2,191	5,294	9,466	16,951	1,322	3,193	5,710	10,224
1995	2,484	4,723	8,726	15,933	1,498	2,849	5,263	9,610
1996	1,258	4,700	8,507	14,465	759	2,835	5,131	8,725
1997	1,226	4,408	7,880	13,514	739	2,659	4,753	8,151
1998	1,656	4,051	7,725	13,432	999	2,443	4,660	8,102
1999	1,538	4,622	7,684	13,844	928	2,788	4,635	8,350
2000	1,447	4,402	7,441	13,290	873	2,655	4,488	8,016
2001	1,355	4,684	7,120	13,159	817	2,825	4,295	7,937
2002	1,137	4,118	7,273	12,528	686	2,484	4,387	7,556
2003	1,088	4,914	6,822	12,824	656	2,964	4,115	7,735
2004	915	4,945	6,735	12,595	552	2,983	4,062	7,597
2005	1,145	4,346	7,692	13,183	691	2,621	4,640	7,952
2006	1,022	4,375	7,491	12,888	616	2,639	4,518	7,774
2007	959	3,958	7,262	12,179	578	2,387	4,380	7,346
2008	773	4,302	5,588	10,663	466	2,595	3,371	6,432

Table 4. Estimates (thousands of pounds, *net weight* and metric tons, *round weight*) of bycatch mortality of Pacific halibut (*Hippoglossus stenolepis*) from all sources by IPHC regulatory subarea for 1962 through 2008. Estimates for 2008 are preliminary and subject to change as new information becomes available.

Year	Thousands of pounds, net weight							Metric tons, round weight						
	Area 2A	Area 2B	Area 2C	Area 3A	Area 3B	Area 4	Total	Area 2A	Area 2B	Area 2C	Area 3A	Area 3B	Area 4	Total
1962	-	1,176	207	1,919	1,164	4,143	8,609	-	709	125	1,157	702	2,499	5,192
1963	-	1,077	206	3,314	2,788	2,038	9,423	-	649	124	1,999	1,682	1,229	5,683
1964	-	1,105	205	9,370	2,269	2,965	15,914	-	667	124	5,652	1,369	1,788	9,599
1965	-	1,435	205	6,097	10,442	3,182	21,361	-	866	124	3,678	6,298	1,919	12,884
1966	-	1,666	213	4,513	7,982	3,400	17,774	-	1,005	128	2,722	4,815	2,051	10,721
1967	-	1,652	439	4,633	4,895	4,718	16,337	-	996	265	2,795	2,953	2,846	9,854
1968	-	1,963	515	5,476	1,577	5,685	15,216	-	1,184	311	3,303	951	3,429	9,178
1969	-	2,183	468	3,806	1,174	7,599	15,230	-	1,317	282	2,296	708	4,584	9,186
1970	-	1,470	562	3,389	2,841	8,028	16,290	-	886	339	2,044	1,714	4,842	9,825
1971	-	1,745	539	2,974	1,367	13,095	19,720	-	1,052	325	1,794	825	7,899	11,894
1972	-	1,750	756	5,406	1,693	9,675	19,280	-	1,056	456	3,261	1,021	5,836	11,629
1973	-	1,509	848	4,452	2,695	8,029	17,533	-	910	511	2,685	1,626	4,843	10,575
1974	477	1,729	532	5,247	3,420	7,620	19,025	288	1,043	321	3,165	2,063	4,596	11,475
1975	477	1,909	639	3,158	2,073	3,650	11,906	288	1,151	385	1,905	1,250	2,202	7,181
1976	477	2,064	708	3,495	2,443	4,564	13,751	288	1,245	427	2,108	1,474	2,753	8,294
1977	477	1,817	580	4,094	1,894	2,914	11,776	288	1,096	350	2,469	1,142	1,758	7,103
1978	477	1,471	377	3,055	1,840	5,023	12,242	288	887	227	1,843	1,110	3,029	7,384
1979	476	1,852	821	5,780	935	5,419	15,282	287	1,117	495	3,486	564	3,269	9,218
1980	476	1,372	520	5,852	1,246	9,235	18,702	287	828	314	3,530	752	5,570	11,280
1981	475	1,188	507	4,720	1,563	6,408	14,859	287	716	306	2,847	942	3,865	8,963
1982	475	867	302	3,797	2,175	4,756	12,373	287	523	182	2,290	1,312	2,869	7,463
1983	476	943	304	2,957	1,935	4,269	10,883	287	568	183	1,784	1,167	2,575	6,564
1984	475	1,074	302	2,140	1,507	4,692	10,189	287	648	182	1,290	909	2,830	6,146
1985	475	1,139	301	1,001	577	4,207	7,700	287	687	182	604	348	2,538	4,644
1986	476	1,161	303	836	410	5,576	8,762	287	700	183	504	247	3,363	5,285
1987	476	1,649	303	2,240	873	5,738	11,279	287	995	183	1,351	527	3,461	6,803
1988	477	1,609	303	3,365	50	8,858	14,662	288	971	183	2,030	30	5,343	8,844
1989	477	1,498	303	3,267	818	7,282	13,646	288	904	183	1,971	494	4,393	8,231
1990	408	1,679	856	4,114	2,045	8,580	17,682	246	1,013	516	2,481	1,233	5,175	10,665
1991	408	1,992	733	4,843	1,671	10,022	19,669	246	1,202	442	2,921	1,008	6,045	11,864
1992	444	1,745	736	4,668	1,982	10,718	20,293	268	1,053	444	2,816	1,195	6,465	12,240
1993	444	1,661	742	4,291	1,062	7,764	15,964	268	1,002	448	2,588	641	4,683	9,629
1994	444	1,219	528	3,907	1,387	9,466	16,951	268	735	318	2,357	837	5,710	10,224
1995	614	1,522	348	2,963	1,760	8,726	15,933	370	918	210	1,787	1,062	5,263	9,610
1996	614	299	345	2,743	1,957	8,507	14,465	370	180	208	1,655	1,180	5,131	8,725
1997	614	215	397	2,965	1,443	7,880	13,514	370	130	239	1,788	870	4,753	8,151
1998	1,082	213	361	2,662	1,389	7,725	13,432	653	128	218	1,606	838	4,660	8,102
1999	987	193	358	2,885	1,737	7,684	13,844	595	116	216	1,740	1,048	4,635	8,350
2000	822	230	395	2,892	1,510	7,441	13,290	496	139	238	1,744	911	4,488	8,016
2001	837	177	341	3,009	1,675	7,120	13,159	505	107	206	1,815	1,010	4,295	7,937
2002	553	244	340	2,194	1,924	7,273	12,528	334	147	205	1,323	1,161	4,387	7,556
2003	503	244	341	3,180	1,734	6,822	12,824	303	147	206	1,918	1,046	4,115	7,735
2004	302	251	362	3,671	1,274	6,735	12,595	182	151	218	2,214	768	4,062	7,597
2005	459	346	340	3,220	1,126	7,692	13,183	277	209	205	1,942	679	4,640	7,952
2006	387	294	341	2,975	1,400	7,491	12,888	233	177	206	1,794	844	4,518	7,774
2007	298	319	342	2,843	1,115	7,262	12,179	180	192	206	1,715	673	4,380	7,346
2008	298	131	344	2,964	1,338	5,588	10,663	180	79	207	1,788	807	3,371	6,432

Table 5. Estimates (thousands of pounds, *net weight* and metric tons, *round weight*) of bycatch mortality of Pacific halibut (*Hippoglossus stenolepis*) from all sources by geographic region of the coast for 1962 through 2008. Estimates for 2008 are preliminary and subject to change as new information becomes available.

Year	Thousands of Pounds, <i>net weight</i>					Metric tons, <i>round weight</i>				
	WA,OR, CA	B.C.	Gulf of Alaska	Bering Sea & Aleut.	Total	WA,OR, CA	B.C.	Gulf of Alaska	Bering Sea & Aleut.	Total
1962	-	1,176	3,290	4,143	8,609	-	709	1,984	2,499	5,192
1963	-	1,077	6,308	2,038	9,423	-	649	3,805	1,229	5,683
1964	-	1,105	11,844	2,965	15,914	-	667	7,144	1,788	9,599
1965	-	1,435	16,744	3,182	21,361	-	866	10,100	1,919	12,884
1966	-	1,666	12,708	3,400	17,774	-	1,005	7,665	2,051	10,721
1967	-	1,652	9,967	4,718	16,337	-	996	6,012	2,846	9,854
1968	-	1,963	7,568	5,685	15,216	-	1,184	4,565	3,429	9,178
1969	-	2,183	5,448	7,599	15,230	-	1,317	3,286	4,584	9,186
1970	-	1,470	6,792	8,028	16,290	-	886	4,097	4,842	9,825
1971	-	1,745	4,880	13,095	19,720	-	1,052	2,943	7,899	11,894
1972	-	1,750	7,855	9,675	19,280	-	1,056	4,738	5,836	11,629
1973	-	1,509	7,995	8,029	17,533	-	910	4,822	4,843	10,575
1974	477	1,729	9,199	7,620	19,025	288	1,043	5,549	4,596	11,475
1975	477	1,909	5,870	3,650	11,906	288	1,151	3,541	2,202	7,181
1976	477	2,064	6,646	4,564	13,751	288	1,245	4,009	2,753	8,294
1977	477	1,817	6,568	2,914	11,776	288	1,096	3,962	1,758	7,103
1978	477	1,471	5,272	5,023	12,242	288	887	3,180	3,029	7,384
1979	476	1,852	7,536	5,419	15,282	287	1,117	4,545	3,269	9,218
1980	476	1,372	7,619	9,235	18,702	287	828	4,595	5,570	11,280
1981	475	1,188	6,789	6,408	14,859	287	716	4,095	3,865	8,963
1982	475	867	6,274	4,756	12,373	287	523	3,784	2,869	7,463
1983	476	943	5,196	4,269	10,883	287	568	3,134	2,575	6,564
1984	475	1,074	3,949	4,692	10,189	287	648	2,382	2,830	6,146
1985	475	1,139	1,879	4,207	7,700	287	687	1,133	2,538	4,644
1986	476	1,161	1,549	5,576	8,762	287	700	934	3,363	5,285
1987	476	1,649	3,416	5,738	11,279	287	995	2,060	3,461	6,803
1988	477	1,609	3,718	8,858	14,662	288	971	2,243	5,343	8,844
1989	477	1,498	4,388	7,282	13,646	288	904	2,647	4,393	8,231
1990	408	1,679	7,015	8,580	17,682	246	1,013	4,231	5,175	10,665
1991	408	1,992	7,247	10,022	19,669	246	1,202	4,371	6,045	11,864
1992	444	1,745	7,386	10,718	20,293	268	1,053	4,455	6,465	12,240
1993	444	1,661	6,095	7,764	15,964	268	1,002	3,676	4,683	9,629
1994	444	1,219	5,822	9,466	16,951	268	735	3,512	5,710	10,224
1995	614	1,522	5,071	8,726	15,933	370	918	3,059	5,263	9,610
1996	614	299	5,045	8,507	14,465	370	180	3,043	5,131	8,725
1997	614	215	4,805	7,880	13,514	370	130	2,898	4,753	8,151
1998	1,082	213	4,412	7,725	13,432	653	128	2,661	4,660	8,102
1999	987	193	4,980	7,684	13,844	595	116	3,004	4,635	8,350
2000	822	230	4,797	7,441	13,290	496	139	2,893	4,488	8,016
2001	837	177	5,025	7,120	13,159	505	107	3,031	4,295	7,937
2002	553	244	4,458	7,273	12,528	334	147	2,689	4,387	7,556
2003	503	244	5,255	6,822	12,824	303	147	3,170	4,115	7,735
2004	302	251	5,307	6,735	12,595	182	151	3,201	4,062	7,597
2005	459	346	4,686	7,692	13,183	277	209	2,826	4,640	7,952
2006	387	294	4,716	7,491	12,888	233	177	2,845	4,518	7,774
2007	298	319	4,300	7,262	12,179	180	192	2,594	4,380	7,346
2008	298	131	4,646	5,588	10,663	180	79	2,802	3,371	6,432

Table 6. Estimates (thousands of pounds, *net weight* and metric tons, *round weight*) of the bycatch mortality of Pacific halibut (*Hippoglossus stenolepis*) from the Alaskan groundfish fishery for 1990 through 2008. Estimates for 2008 are preliminary and subject to change as new information becomes available. All federally managed fisheries are represented, including the Individual Fisheries Quota sablefish fishery and Community Development Quota fisheries. However, fisheries operating within State of Alaska jurisdiction, e.g., Chatham Strait sablefish fishery, are excluded.

Gulf of Alaska								
Year	Thousands of pounds, net weight				Metric tons, round weight			
	Trawls	H&L	Pot	Total	Trawls	H&L	Pot	Total
1990	4,331	2,012	52	6,395	2,612	1,214	31	3,857
1991	4,538	2,081	7	6,626	2,737	1,255	4	3,997
1992	4,060	2,684	26	6,770	2,449	1,619	16	4,083
1993	3,548	1,900	19	5,467	2,140	1,146	19	3,305
1994	3,619	1,512	23	5,154	2,183	912	14	3,109
1995	3,745	645	35	4,425	2,259	389	21	2,669
1996	3,890	498	11	4,399	2,346	300	7	2,653
1997	3,291	855	13	4,159	1,985	516	8	2,509
1998	3,042	705	19	3,766	1,835	425	11	2,272
1999	3,333	854	147	4,334	2,010	515	89	2,614
2000	3,416	718	17	4,151	2,060	433	10	2,504
2001	3,724	614	41	4,379	2,246	370	25	2,641
2002	3,193	615	4	3,812	1,926	371	2	2,299
2003	3,748	827	34	4,609	2,261	499	21	2,780
2004	3,899	710	52	4,661	2,352	428	31	2,811
2005	3,526	457	57	4,040	2,127	276	34	2,437
2006	3,265	778	27	4,070	1,969	469	16	2,455
2007	3,142	479	33	3,654	1,895	289	20	2,204
2008	3,043	912	45	4,000	1,835	550	27	2,413

Bering Sea/Aleutians								
Year	Thousands of pounds, net weight				Metric tons, round weight			
	Trawls	H&L	Pot	Total	Trawls	H&L	Pot	Total
1990	4,331	2,012	52	6,395	2,612	1,214	31	3,857
1991	4,538	2,081	7	6,626	2,737	1,255	4	3,997
1992	4,060	2,684	26	6,770	2,449	1,619	16	4,083
1993	3,548	1,900	19	5,467	2,140	1,146	19	3,305
1994	3,619	1,512	23	5,154	2,183	912	14	3,109
1995	3,745	645	35	4,425	2,259	389	21	2,669
1996	3,890	498	11	4,399	2,346	300	7	2,653
1997	3,291	855	13	4,159	1,985	516	8	2,509
1998	3,042	705	19	3,766	1,835	425	11	2,272
1999	3,333	854	147	4,334	2,010	515	89	2,614
2000	3,416	718	17	4,151	2,060	433	10	2,504
2001	3,724	614	41	4,379	2,246	370	25	2,641
2002	3,193	615	4	3,812	1,926	371	2	2,299
2003	3,748	827	34	4,609	2,261	499	21	2,780
2004	5,675	754	6	6,435	3,423	455	4	3,881
2005	6,582	808	2	7,392	3,970	487	1	4,459
2006	6,456	727	8	7,191	3,894	439	5	4,337
2007	6,150	805	7	6,962	3,710	486	4	4,199
2008	4,116	1,162	10	5,288	2,483	701	6	3,190

Table 6. (Continued)

Alaska Total								
Year	Thousands of pounds, net weight				Metric tons, round weight			
	Trawls	H&L	Pot	Total	Trawls	H&L	Pot	Total
1990	10,640	2,639	56	13,335	6,418	1,592	34	8,043
1991	12,792	3,545	11	16,348	7,716	2,138	7	9,861
1992	11,682	5,459	47	17,188	7,046	3,293	28	10,367
1993	10,151	2,761	19	12,931	6,123	1,665	19	7,807
1994	10,818	3,456	32	14,306	6,525	2,085	19	8,629
1995	10,355	2,376	60	12,791	6,246	1,433	36	7,715
1996	10,472	2,033	41	12,546	6,316	1,226	25	7,567
1997	9,238	2,419	22	11,679	5,572	1,459	13	7,044
1998	8,987	2,114	30	11,131	5,421	1,275	18	6,714
1999	9,492	2,068	158	11,718	5,725	1,247	95	7,068
2000	8,859	2,392	41	11,292	5,344	1,443	25	6,811
2001	9,103	2,042	54	11,199	5,491	1,232	33	6,755
2002	8,915	1,849	21	10,785	5,377	1,115	13	6,505
2003	9,524	1,545	62	11,131	5,745	932	37	6,714
2004	9,574	1,464	58	11,096	5,775	883	35	6,693
2005	10,108	1,265	59	11,432	6,097	763	36	6,895
2006	9,721	1,505	35	11,261	5,863	908	21	6,792
2007	9,292	1,284	40	10,616	5,605	774	24	6,403
2008	7,159	2,074	55	9,288	4,318	1,251	33	5,602

Table 7. Estimates of 2008 groundfish catch and Pacific halibut bycatch mortality by region, gear and target fishery in the groundfish fisheries off Alaska. Does not include Individual Fishing Quota or Community Development Quota fisheries. Data current through November 1, 2008.

Region & Target fishery	Hook & Line		Pot		Trawl	
	Groundfish Catch (mt)	Hbt Byc Mort (mt)	Groundfish Catch (mt)	Hbt Byc Mort (mt)	Groundfish Catch (mt)	Hbt Byc Mort (mt)
<i>Bering Sea</i>						
Alaska plaice					112	1
Arrowtooth flndr	2	0			15,497	128
Atka mackerel					59,838	64
Bottom pollock	9	0			55,386	49
Flathead sole					27,865	222
Midwater pollock					823,213	219
Other flatfish					163	12
Other species	88	1				
Pacific cod	93,052	639	18,934	5	43,444	339
Rock sole					63,721	649
Rockfish					13,177	35
Sablefish			613	1	13	1
Turbot	880	2			431	0
Yellowfin sole					161,556	681
Total	94,031	642	19,546	6	1,264,416	2,400
<i>Gulf of Alaska</i>						
Arrowtooth flndr					24,610	507
Bottom pollock					16,743	65
Flathead sole					1,886	63
Midwater pollock					32,180	2
Other species					1	0
Pacific cod	13,461	407	18,106	27	22,805	573
Rex sole					4,614	105
Rockfish					23,715	101
Sablefish					360	3
Shallow water flats					13,244	417
Total	13,461	407	18,106	27	140,160	1,836

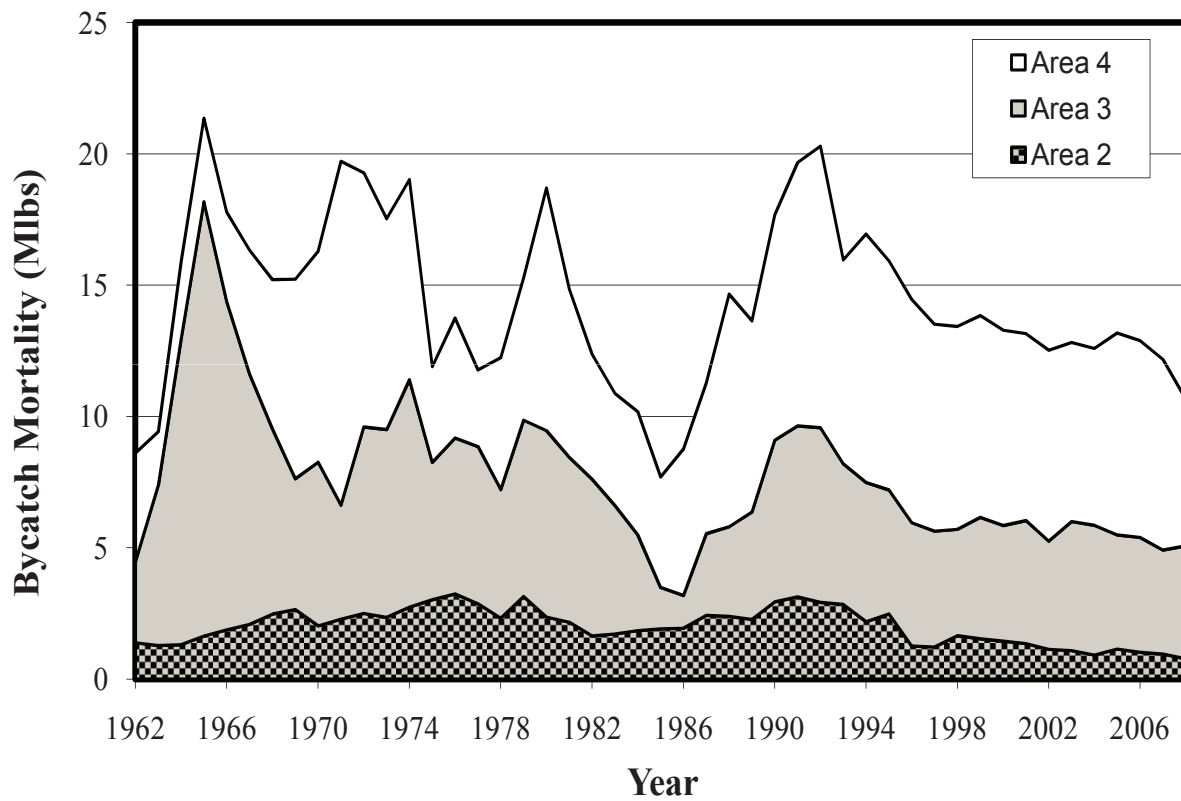


Figure 1. Bycatch mortality of Pacific halibut by IPHC regulatory area, 1962-2008.

