

# Incidental catch and mortality of Pacific halibut, 1962-2003

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## Abstract

Estimates of the bycatch mortality of Pacific halibut (*Hippoglossus stenolepis*) in 2003 totaled 12.3 million pounds (net weight), a decrease from 2002 and the lowest seen since 1987. Bycatch mortality increased in Area 3, decreased in Area 4, and was relatively unchanged in Area 2. Changes in fishery scheduling and closure of some Alaskan fishing grounds to protect sea lions affected halibut bycatch off Alaska.

## 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 (i.e., those fish that die) in 2002 is 12.3 million pounds, a decrease from 2002 and the lowest seen since 1987. This document provides an overview of areas and fisheries which contributed to halibut bycatch mortality in 2003.

## Sources of bycatch information and estimates

For most fisheries, IPHC relies upon information supplied by observer programs for bycatch estimates. 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) oversees 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 2003 were based on bycatch reported from fishing conducted through mid-November and projections for fishing 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 and are based on bycatch rates observed on research surveys because direct fishery observations 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 Canada's 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).

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). Most recent estimates have been provided by Wallace and Hastie (2003). 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 in other reports (Clark et al. 1992, Williams 1997).

Observer data are used to estimate DMRs in the groundfish fishery off Alaska. NMFS manages these fisheries according to a schedule of DMRs; the 2003 schedule is summarized in Table 1. DMRs for previous years can be found in “Pacific Halibut Discard Mortality Rates in the 1990-2002 Alaskan Groundfish Fisheries, with Recommendations for Monitoring in 2004” by Williams and Chen (this volume).

IPHC assumes DMRs for most other fisheries. For Area 2A, the domestic groundfish trawl and shrimp trawls are assumed to have a 50% mortality rate, whereas 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% rate, based on the large catches of whiting typical of this type of fishery. In Area 2B, observers monitoring the Canadian trawl fishery examine each halibut to determine survival. Data collected by observers in the state-managed scallop fisheries indicate a 50% discard mortality rate is appropriate.

## **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 2003 total 12.2 million pounds, representing a slight, 2% decrease from 2002 and a 39% decrease from 1992. Most of the decrease is attributed to the introduction of Individual Fishing Quotas (IFQs) in the Alaskan sablefish fishery, the Careful Release program for the Alaskan hook-&-line fishery, and Individual Vessel Bycatch Quotas (IVBQs) in the Canadian trawl fishery.

Estimates of bycatch mortality by fishery and major IPHC regulatory area for 1994 through 2003 are shown in Table 2 and discussed in the following sections. Tables 3 through 5 provide bycatch mortality estimates by various area groupings. Table 6 provides estimates of bycatch mortality in the Alaskan groundfish fisheries.

## **Area 2**

Bycatch mortality in Area 2 in 2003 was estimated at 1.14 million pounds, essentially unchanged from 2002 and below the 10-year average of 1.54 million pounds recorded since 1994 (Table 2). The primary sources for bycatch mortality in Area 2 are the groundfish trawl fisheries in 2A and 2B, and the crab and shrimp fisheries in 2C. NMFS estimated halibut bycatch mortality for the 2002 trawl fishery at 512,000 pounds, using observer data for the first time. This estimate has been rolled over for 2003, but will be updated when an actual estimate for 2003 is obtained. Trawl fishery effort has been declining annually for the past few years in Area 2A and will likely decline even further in response to large-scale area closures instituted by the Pacific Fishery Management Council, and a recently-approved vessel buy-back program. These closures are expected to significantly affect trawl effort but the impact on bycatch won't be known for several years. No new estimate is available for the shrimp trawl fishery, so the most recent estimate is rolled forward.

In Area 2B, trawl fishery bycatch was estimated at 0.25 million pounds, unchanged from 2002. This is only slightly above the average of 0.23 million pounds which has occurred since the Individual Bycatch Quota program began in 1996. In Area 2C, crab pot fishing and shrimp trawling occur in various locations and harvests have held steady over the years. IPHC staff have not reviewed these fisheries since the early 1990s, but we assume mortality has been relatively unchanged since then.

## **Area 3**

Bycatch mortality in Area 3 was estimated at 4.35 million pounds in 2003, a 6 percent increase from 2002. The groundfish fishery continued to be affected by fishery closures inside sea lion critical habitat, which forced vessels to fish in less productive areas and ultimately reduced effort. Pot effort for cod continues to grow and in 2003 pots took the largest share of the cod harvest. Bycatch increased 27% in Area 3A but decreased 19% in Area 3B. In Area 3A, trawl and hook-&-line fishery bycatch jumped up after an unusually low level in 2002. For both gears the 2003 estimates remained below the 10-year average. In Area 3B, trawl and hook-&-line fishery bycatch declined roughly 20% from 2002, to levels seen during 1997-2000. As in Area 3A, these changes were in response to changes in fishing locations.

## **Area 4**

Bycatch mortality in Area 4 decreased 6% in 2003, to 6.8 million pounds, the lowest level seen since 1987. Total mortality was lower for both hook-&-line and trawl fisheries, due in part to lower quotas for Pacific cod. In particular, hook-&-line fisheries encountered lower halibut bycatch rates in 2003, caught roughly 20% less cod than in 2002 and were not closed by the halibut bycatch limit. Trawl fishery bycatch went down slightly, also reflecting lower quotas for cod and closures of prime grounds to protect Steller sea lions. Mortality in the pot fishery for cod dropped to 7,000 pounds, the lowest seen since the early 1990s when pot fishing for cod began. The Community Development Quota (CDQ) fishery targeted mainly on pollock and resulted in about 200,000 pounds of bycatch mortality, more than in 1998-1999 when the CDQ fishery focused more on cod.

## **References**

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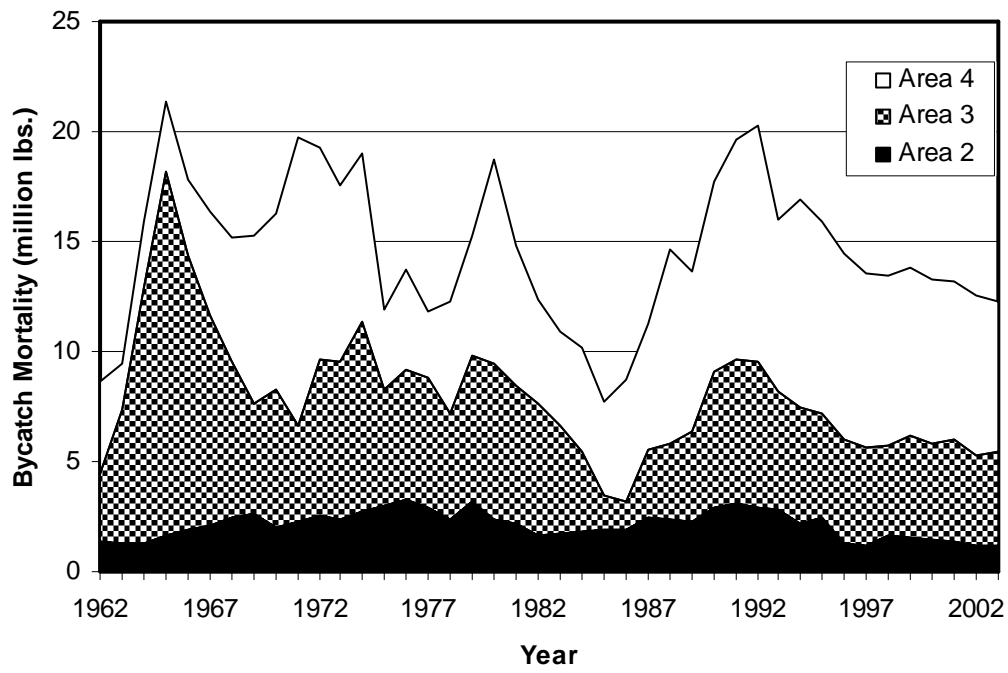
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**Figure 1. Historical trend in bycatch mortality of Pacific halibut by IPHC regulatory area.**

**Table 1. Preseason assumed discard mortality rates used by NMFS for monitoring halibut bycatch mortality in 2003 in the Alaskan groundfish fisheries. From Williams and Chen (this volume).**

<b>Bering Sea/Aleutians Fishery</b>	<b>2003 Preseason Assumed DMR</b>	<b>Gulf of Alaska Fishery</b>	<b>2003 Preseason Assumed DMR</b>
<i>Trawls</i>		<i>Trawls</i>	
Atka mackerel	81	Atka mackerel	57
Bottom trawl pollock	76	Bottom trawl pollock	61
Pacific cod	66	Pacific cod	63
Other flatfish	75	Deep water flatfish	56
Rockfish	64	Shallow water flatfish	69
Flathead sole	64	Rockfish	66
Other species	66	Flathead sole	57
Midwater pollock	87	Other species	66
Rock sole	79	Midwater pollock	75
Sablefish	23	Sablefish	71
Turbot	81	Arrowtooth flounder	55
Yellowfin sole	81	Rex sole	53
<i>Pots</i>		<i>Pots</i>	
Pacific cod	9	Pacific cod	14
Other species	9	Other species	14
<i>Hook &amp; Line</i>		<i>Hook &amp; Line</i>	
Pacific cod	11	Pacific cod	17
Rockfish	28	Rockfish	11
Other species	11	Other species	17
Turbot	20		

**Table 2. Estimates (thousands of pounds, *net weight*) of bycatch mortality of Pacific halibut (*Hippoglossus stenolepis*) by year, area, and fishery for 1994 through 2003. Estimates for 2003 are preliminary and subject to change as new information becomes available.**

<b>Region and Area</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>
<b>AREA 2A</b>										
Groundfish Trawl	385	548	548	548	1,041	946	781	796	512	512
Shrimp Trawl	43	50	50	50	25	25	25	25	25	25
Hook & Line	16	16	16	16	16	16	16	16	16	16
<b>Total</b>	<b>444</b>	<b>614</b>	<b>614</b>	<b>614</b>	<b>1,082</b>	<b>987</b>	<b>822</b>	<b>837</b>	<b>553</b>	<b>553</b>
<b>AREA 2B</b>										
Domestic Trawl	1,219	1,522	299	215	213	193	230	177	244	247
<b>Total</b>	<b>1,219</b>	<b>1,522</b>	<b>299</b>	<b>215</b>	<b>213</b>	<b>193</b>	<b>230</b>	<b>177</b>	<b>244</b>	<b>247</b>
<b>AREA 2C</b>										
Crab Pot/Shrimp Trawl	303	303	303	303	303	303	303	303	303	303
Groundfish Trawl	13	1	2	46	4	1	0	0	0	0
Hook & Line (non-IFQ)	174	8	4	12	18	18	56	2	1	2
Hook & Line (IFQ)	-	3	3	3	3	3	3	3	3	3
Scallop Trawl	5	0	0	0	0	0	0	0	0	0
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
<b>Total</b>	<b>528</b>	<b>348</b>	<b>345</b>	<b>397</b>	<b>361</b>	<b>358</b>	<b>395</b>	<b>341</b>	<b>340</b>	<b>341</b>
<b>AREA 2 Subtotal</b>	<b>2,191</b>	<b>2,484</b>	<b>1,258</b>	<b>1,226</b>	<b>1,656</b>	<b>1,538</b>	<b>1,447</b>	<b>1,355</b>	<b>1,137</b>	<b>1,141</b>
<b>AREA 3A</b>										
Crab Pot/Shrimp Trawl	250	250	250	250	250	250	250	250	250	250
Groundfish Trawl	2,700	2,299	2,198	2,044	1,908	2,148	2,222	2,404	1,685	2,121
Hook & Line (non-IFQ)	913	267	159	534	360	317	281	203	128	287
Hook & Line (IFQ)	-	119	119	119	119	119	119	119	119	119
Groundfish Pot	17	18	7	8	15	41	10	23	2	3
Scallop Trawl	17	0	0	0	0	0	0	0	0	0
Pr Wm Sd Sablefish	10	10	10	10	10	10	10	10	10	10
<b>Total</b>	<b>3,907</b>	<b>2,963</b>	<b>2,743</b>	<b>2,965</b>	<b>2,662</b>	<b>2,885</b>	<b>2,892</b>	<b>3,009</b>	<b>2,194</b>	<b>2,790</b>
<b>AREA 3B</b>										
Crab Pot/Shrimp Trawl	50	50	50	50	50	50	50	50	50	50
Groundfish Trawl	906	1,445	1,690	1,201	1,130	1,184	1,194	1,320	1,508	1,177
Hook & Line (non-IFQ)	425	132	97	71	89	281	143	171	248	201
Hook & Line (IFQ)	-	116	116	116	116	116	116	116	116	116
Groundfish Pot	6	17	4	5	4	106	7	18	2	20
<b>Total</b>	<b>1,387</b>	<b>1,760</b>	<b>1,957</b>	<b>1,443</b>	<b>1,389</b>	<b>1,737</b>	<b>1,510</b>	<b>1,675</b>	<b>1,924</b>	<b>1,564</b>
<b>AREA 3 Subtotal</b>	<b>5,294</b>	<b>4,723</b>	<b>4,700</b>	<b>4,408</b>	<b>4,051</b>	<b>4,622</b>	<b>4,402</b>	<b>4,684</b>	<b>4,118</b>	<b>4,354</b>
<b>AREA 4</b>										
Crab Pot/Shrimp Trawl	300	300	300	300	300	300	300	300	300	300
Groundfish Trawl	7,199	6,610	6,582	5,947	5,795	5,972	5,379	5,322	5,591	5,470
Hook & Line (non-IFQ)	1,944	1,731	1,535	1,564	1,409	982	1,508	1,300	1,058	742
Hook & Line (IFQ)	-	60	60	60	60	60	60	60	60	60
Groundfish Pot	9	25	30	9	11	11	24	13	17	7
CDQ Trawl	-	-	-	-	150	187	64	57	131	144
CDQ Longline	-	-	-	-	-	172	106	68	116	78
Scallop Trawl	14	0	0	0	0	0	0	0	0	0
<b>AREA 4 Subtotal</b>	<b>9,466</b>	<b>8,726</b>	<b>8,507</b>	<b>7,880</b>	<b>7,725</b>	<b>7,684</b>	<b>7,441</b>	<b>7,120</b>	<b>7,273</b>	<b>6,801</b>
<b>GRAND TOTAL</b>	<b>16,951</b>	<b>15,933</b>	<b>14,465</b>	<b>13,514</b>	<b>13,432</b>	<b>13,844</b>	<b>13,290</b>	<b>13,159</b>	<b>12,528</b>	<b>12,296</b>

**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 2003. Estimates for 2003 are preliminary and subject to change as new information becomes available.**

Year	<i>Thousands of Pounds, net weight</i>				<i>Metric Tons, round weight</i>			
	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	1,141	4,354	6,801	12,296	688	2,626	4,102	7,417

**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 2003. Estimates for 2003 are preliminary and subject to change as new information becomes available.**

Year	<i>Thousands of Pounds, net weight</i>							<i>Metric Tons, round weight</i>						
	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	553	247	341	2,790	1,564	6,801	12,296	334	149	206	1,683	943	4,102	7,417

**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 2003. Estimates for 2003 are preliminary and subject to change as new information becomes available.**

Year	<i>Thousands of Pounds, net weight</i>					<i>Metric Tons, round weight</i>				
	Wash., Oreg., Calif.	British Columbia	Gulf of Alaska	Bering Sea & Aleu.	Total	Wash., Oreg., Calif.	British Columbia	Gulf of Alaska	Bering Sea & Aleu.	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	553	247	4,695	6,801	12,296	334	149	2,832	4,102	7,417

**Table 6. Estimates (thousands of pounds, *net weight* and metric tons, *round weight*) of bycatch mortality of Pacific halibut (*Hippoglossus stenolepis*) from the Alaskan groundfish fishery for 1991 through 2003. Estimates for 2003 are preliminary and subject to change as new information becomes available. All federally managed fisheries are represented, including the IFQ sablefish fishery and Community Development Quota (CDQ) fisheries. However, fisheries occurring entirely in state waters (e.g., Chatham Strait sablefish fishery) are excluded.**

Area/Year	<i>Thousands of Pounds, net weight</i>				<i>Metric Tons, round weight</i>			
	Trawls	H&L	Pot	Total	Trawls	H&L	Pot	Total
<i>Bering Sea/Aleutians</i>								
1990	6,309	627	4	6,940	3,805	378	2	4,186
1991	8,254	1,464	4	9,722	4,979	883	2	5,864
1992	7,622	2,775	21	10,418	4,597	1,674	13	6,284
1993	6,603	861	tr	7,464	3,983	519	tr	4,502
1994	7,199	1,944	9	9,152	4,342	1,173	5	5,520
1995	6,610	1,731	25	8,366	3,987	1,044	15	5,046
1996	6,582	1,535	30	8,147	3,970	926	18	4,914
1997	5,947	1,564	9	7,520	3,587	943	5	4,536
1998	5,945	1,409	11	7,365	3,586	850	7	4,442
1999	6,159	1,214	11	7,384	3,715	732	7	4,454
2000	5,443	1,674	24	7,141	3,283	1,010	14	4,307
2001	5,379	1,428	13	6,820	3,244	861	8	4,114
2002	5,722	1,234	17	6,973	3,451	744	10	4,206
2003	5,614	880	7	6,501	3,386	531	4	3,921
<i>Gulf of Alaska</i>								
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	3,206	645	35	3,886	1,934	389	21	2,344
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	3,298	728	23	4,049	1,989	439	14	2,442
<i>Alaska Total</i>								
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	9,816	2,376	60	12,252	5,921	1,433	36	7,390
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	8,912	1,608	30	10,550	5,376	970	18	6,364