

## **Summary of catch, discards, and retention of flathead sole, rock sole, and pollock for AFA and Amendment 80 vessels<sup>1</sup>**

December 2014

In October 2014, the Council tasked staff to **provide a brief data summary of catch, discards, and retention on a haul-by-haul basis for incidental catch of BSAI flathead sole and BSAI rock sole for American Fisheries Act (AFA) vessels and incidental catch of BS pollock for Amendment 80 vessels.** The intent of the request was to improve understanding of incidental catch of flathead sole and rock sole in the BSAI trawl limited access fisheries for AFA vessels and incidental catch of pollock by the Amendment 80 vessels while targeting their Amendment 80 allocations.

### **Data Used for Catch Summary**

All data provided for this catch summary was provided by Alaska Fisheries Information Network (AKFIN) from Catch Accounting System for retained and discarded catch data, and from debriefed Observer data for catch by haul. When comparing real time catch data between Catch Accounting System and debriefed Observer data, the debriefed Observer data is delayed several weeks. As a result, catch data reported by Catch Accounting System is more up to date than haul data.

As noted from Catch Accounting System documentation, a target fishery is determined through the following steps:

1. If retained pollock is 95 percent or greater of the total catch, the target fishery is pelagic pollock. If pollock is the predominant species, but retained pollock is less than 95 percent of the total catch, then the target fishery is non-pelagic pollock. (Note that the distinction between pelagic pollock and non-pelagic pollock is based on catch composition only and is independent of the reported gear type.
2. If the target is not pollock, the dominant species is determined by calculating the proportion of the retained catch for each species.
3. All flatfish (other flatfish (includes Alaska plaice, arrowtooth flounder, and Kamchatka flounder), flathead sole, rocksole, and yellowfin sole) are added together. If this amount is greater than the dominant species in step 2, then an additional step is taken:
  - a. If yellowfin sole is greater than or equal to 70 percent, then the target is yellowfin sole.
  - b. Otherwise the target equals whichever of the other 7 flatfish species is dominate.

### **Amendment 80 Vessels**

#### *Background*

The Bering Sea flatfish fisheries, along with the Atka mackerel and Pacific ocean perch fisheries in the Aleutian Islands, have been prosecuted almost exclusively by a fleet of trawl catcher/processor (C/P) vessels that do not target pollock. This fleet is known as the Amendment 80 fleet. Discards of groundfish has long been a management concern of this fleet. To provide the tools for the fleet to increase retention, the Council initiated development of the Amendment 80 program in October 2002. Amendment 80 identified groundfish trawl C/Ps that were not covered by the AFA (i.e., the head-and-gut fleet for Amendment 80 vessels) and established a framework for future fishing by this fleet. The framework provided for an allocation of the TACs of six groundfish species among trawl fishery sectors, created Amendment 80 quota share for these vessels, facilitated the development of cooperative arrangements among the vessels, and provided for competitive fishery among Amendment 80 vessels not entering a cooperative. The fleet currently includes 23 C/P vessels.

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<sup>1</sup> This report was prepared by Jon McCracken (NPFMC), Mary Furuness (NMFS Alaska Region), and Josh Keaton (NMFS Alaska Region).

Amendment 80 established criteria for harvesters in the Amendment 80 sector to apply for and receive quota share, and for NMFS to initially allocate and transfer quota share. Amendment 80 vessels may choose to operate in a cooperative or in an Amendment 80 limited access sector. Cooperative participants could consolidate fishing operations on a specific Amendment 80 vessel or subset of Amendment 80 vessels, thereby reducing monitoring, enforcement, and other operational costs, and permitting more efficient harvest. The opportunity to trade harvest privileges among cooperatives encourages efficient harvesting, and discourages waste.

On a parallel track, the Council developed Amendment 79 to improve the retention of groundfish species by the trawl C/Ps by establishing minimum groundfish retention standards (GRS) to decrease regulatory and economic discards in the BSAI groundfish fisheries. Regulations implementing Amendment 79 were published on April 6, 2006. The GRS program was phased in over time to allow the affected vessels to adjust to the retention requirements. The schedule for increasing groundfish retention standards by Amendment 79 started in 2008 at 65 percent and increased to 85 percent by 2011 and each year after. Effective March 27, 2013, the GRS program was modified to remove certain regulatory requirements that mandate minimum levels of groundfish retention by non-AFA trawl C/Ps and Amendment 80 cooperatives participating in the BSAI groundfish fisheries. As a result of that action, Amendment 80 cooperatives are now required to annually report their groundfish retention performance as part of the report submitted to NMFS.

Finally, on July 14, 2004, NMFS implemented an action to adjust the MRA enforcement period for pollock harvested in the BSAI management area by non-AFA vessels from enforcement anytime during a fishing trip to enforcement at the time of offload. The intent of the change in MRS enforcement period was to increase the retention of pollock by non-AFA vessels in the BSAI, while not increasing the overall amount of pollock harvested. By allowing vessels to manage their MRA percentage for pollock on an offload-to-offload basis, additional pollock may be retained over the course of a fishing trip. For example, if a vessel operator catches pollock early in a trip in excess of the MRA, the vessel operator may choose to retain the pollock and move to an area with lowering incidental catch rates of pollock, thereby lowering the percentage of pollock retained, with respect to other basis species, prior to the offloading of catch. As long as the amount of pollock onboard the vessel is at or below the appropriate MRA (20 percent) at the time of offload, the vessel would be in compliance.

#### *Data Summary*

Table 1 provides information on EBS pollock age 3+ biomass, retained catch of BS pollock, regulatory discards of BS pollock, total catch of BS pollock, and the percent of BS pollock discarded by Amendment 80 vessels from 2000 through November 3, 2014. One of the first observations seen in the table is the widely oscillating pollock ABC over the 15 year period. During 2000 through 2004, pollock age 3+ biomass increased significantly but was soon followed by a sharp decline over the next six years followed by a modest increase during the last four years. Also provided in the table is total pollock catch by the Amendment 80 vessels, which is composed of both retained catch and regulatory discards of pollock<sup>2</sup>. Looking at pollock catch during the 2000 through 2010 period, the sector appears to follow, in general, the changing pollock age 3+ biomass over the same period as seen in Figure 1. The catch appears evenly divided between retained catch and regulatory discards prior to 2008, but following the implementation of the GRS and the Amendment 80 programs in 2008, regulatory discards of pollock decreased significantly.

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<sup>2</sup> Under the Improved Retention/Improved Utilization regulations at 50 CFR 679.27, all vessels with Federal Fisheries Permits (FFPs) participating in the groundfish fisheries are required to retain all catch of pollock, when directed fishing for these species is open, regardless of gear type employed and target fishery. When directed fishing for pollock is prohibited, as in the case for the Amendment 80 sector, retention of pollock is required only up to the 20 percent MRA currently in effect for all species.

During 2010 and 2011, pollock catch by the Amendment 80 vessels remained at about the same level as the previous three years, but pollock age 3+ biomass increased slightly. However, in 2013 and 2014, catch of pollock by the Amendment 80 sector increased, especially regulatory discards in 2014, while pollock age 3+ biomass remained nearly the same as the previous two years.

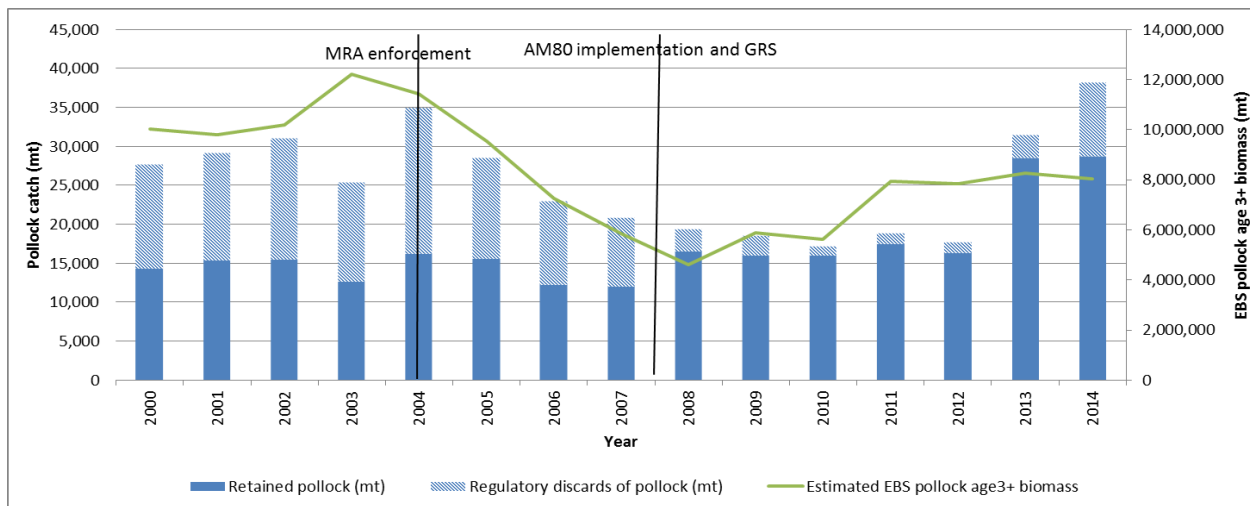
Influencing pollock catch by the Amendment 80 sector since 2008 is the implementation of Amendment 80 program and GRS program starting in that year. As noted in the table, the regulatory discards of pollock by the Amendment 80 sector diminished significantly starting in 2008. These low regulatory discards continued through 2013, while 2014 saw an increase in regulatory discards of pollock. This change in regulatory discards is also reflected in the percent of pollock discarded by the Amendment 80 vessels. Prior to 2008, the percent of regulatory discards ranged from a low of 42 percent in 2007 to a high of 54 percent in 2004. Immediately following the implementation of Amendment 80 program and the GRS in 2008, regulatory discards fell to 15 percent in 2008 and then ranged between 7 and 14 percent for the next five years. In 2014, the percent of pollock discarded by Amendment 80 vessels increased to 27 percent.

**Table 1 Annual EBS pollock age 3+ biomass, total BS pollock catch, retained BS pollock, regulatory discards of BS pollock, and percent of BS pollock discarded by Amendment 80 vessels**

Year	Estimated EBS pollock age3+ biomass	Total pollock catch by AM80 vessels (mt)	Retained pollock by AM80 vessels (mt)	Regulatory discards of pollock by AM80 vessels (mt)	% of pollock discarded by AM80 vessels
2000	10,020,000	28,688	14,367	14,321	50
2001	9,803,000	29,663	15,410	14,253	48
2002	10,182,000	31,348	15,579	15,770	50
2003	12,211,000	25,652	12,741	12,911	50
2004	11,416,000	35,421	16,300	19,121	54
2005	9,522,000	28,856	15,649	13,207	46
2006	7,262,000	23,403	12,335	11,068	47
2007	5,840,000	20,947	12,056	8,891	42
2008	4,607,000	19,363	16,586	2,777	14
2009	5,880,000	18,808	16,102	2,706	14
2010	5,622,000	17,279	16,034	1,245	7
2011	7,928,000	18,911	17,511	1,400	7
2012	7,853,000	17,753	16,424	1,329	7
2013	8,261,000	31,482	28,587	2,895	9
2014*	8,045,000	39,190	28,750	10,440	27

Source: AKFIN. Catch data is from afa\_a80\_rd(11-03) file and pollock age 3+ biomass from 2015 SAFE.

\* 2014 data as of Nov 3.



**Figure 1 Estimated EBS pollock age 3+ biomass (mt), annual retained pollock (mt), and regulatory discards (mt) from 2000 through November 3, 2014**

Table 2 provides the annual number of trawl hauls in the BS by target for the Amendment 80 sector from 2000 through November 3, 2014, which originates from observer data after debriefing. As seen from the table, the number of annual pollock hauls has ranged from a low of 357 in 2012 to a high of 772 in 2004. As a percent of total hauls by the sector, pollock hauls have ranged from a low of 4 percent in 2008 and 2012 to a high of 12 percent in 2001.

**Table 2 Annual number of Amendment 80 trawl hauls in the BS by target from 2000 through November 3, 2014**

Haul target species	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014*
Pollock	601	679	646	520	772	526	551	525	456	540	535	471	357	747	633
<i>% of total annual hauls</i>	<i>9</i>	<i>12</i>	<i>10</i>	<i>9</i>	<i>11</i>	<i>9</i>	<i>10</i>	<i>9</i>	<i>4</i>	<i>5</i>	<i>5</i>	<i>5</i>	<i>4</i>	<i>7</i>	<i>8</i>
Yellowfin Sole	2,590	2,323	2,750	2,282	1,888	2,002	1,843	2,402	4,969	3,797	3,799	4,312	4,209	4,865	2,779
Rock Sole	1,316	1,277	1,441	1,449	1,642	1,555	1,375	1,221	2,950	2,454	3,681	2,407	2,379	2,121	2,487
Flathead Sole	981	698	596	581	748	644	633	614	2,026	1,258	1,007	502	311	829	686
Pacific Cod	487	461	442	539	976	742	747	848	281	454	412	420	372	647	407
Arrowtooth Flounder	215	220	227	251	283	461	340	169	1,040	917	354	635	828	622	566
Atka Mackerel	7	4	6	96	209	115	61	78	27	22	4	2	49	13	1
Greenland Turbot	106	67	37	36	30	10	2	2	13	25	20	61	13	4	10
Other Flatfish	185	43	49	37	70	58	44	67	627	796	678	1043	682	519	644
Other Species	11	5	15	34	38	13	44	25	9	8	1				
Rockfish	17	13	7	18	20	8	8	15	16	41	163	247	295	215	42
Sablefish	6	8	3	2	13	12	4	5	12	4			6	7	2
<b>Total hauls</b>	<b>6,542</b>	<b>5,820</b>	<b>6,231</b>	<b>5,862</b>	<b>6,747</b>	<b>6,172</b>	<b>5,674</b>	<b>5,985</b>	<b>12,431</b>	<b>10,316</b>	<b>10,654</b>	<b>10,100</b>	<b>9,501</b>	<b>10,589</b>	<b>8,257</b>

Source: AKFIN. Catch data is from haul\_tgts(11-03) file.  
\* 2014 data as of Nov 3.

Table 3 provides annual incidental catch of BS pollock by haul target for the Amendment 80 vessels from 2000 through November 3, 2014. As noted in the table, since 2000, the largest amount of incidental catch of pollock tends to be in hauls that had calculated targets of pollock, yellowfin sole, rock sole, and flathead sole. For most years during the 2002 through 2014, the largest amount of incidental catch of BS pollock was reported in pollock target hauls. As a percent of annual incidental catch of BS pollock by the Amendment 80 sector, catch of pollock in pollock target hauls have ranged from a low of 25 percent in 2008 to a high of 44 percent in 2002, 2006, and 2007. For yellowfin sole haul targets, the percent of total incidental catch of BS pollock by the sector has ranged from a low of 10 percent in 2007 to a high of 35 percent in 2001. For rock sole haul targets, the percent of total incidental catch of BS pollock has ranged from a low of 11 percent in 2001 and 2007 to a high of 26 percent in 2010. Finally, for flathead sole haul targets, the percent of total incidental BS pollock has ranged from a low of 4 percent in 2002 and 2012 to a high of 19 percent in 2008. Looking specifically at the years 2013 and 2014, incidental catch of BS pollock by the Amendment 80 sector was reported in pollock target hauls at 38 percent and 33 percent, respectively, followed by yellowfin sole in 2013 at 28 percent and rock sole in 2014 at 25 percent.

**Table 3 Amendment 80 annual incidental catch of BS pollock by haul target from 2000 through November 3, 2014**

Haul target species	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014*
Pollock	6,700	7,530	8,272	5,122	8,983	6,816	6,462	5,663	4,859	6,139	6,886	6,112	5,026	11,823	10,047
% of total pollock catch by sector	35	41	44	31	39	36	44	44	25	33	40	33	28	38	37
Yellowfin Sole	5,622	6,346	5,038	5,760	4,593	4,703	2,084	1,303	4,690	3,502	2,257	4,356	4,843	8,906	5,021
% of total pollock catch by sector	29	35	27	35	20	25	14	10	24	19	13	23	27	28	16
Rock Sole	3,351	2,043	3,691	2,972	5,070	3,564	2,808	1,396	4,299	4,034	4,482	4,362	4,542	4,714	7,676
% of total pollock catch by sector	17	11	19	18	22	19	19	11	22	21	26	23	26	15	25
Flathead Sole	2,263	1,393	724	1,224	1,850	1,598	914	1,147	3,604	2,508	2,045	1,351	635	1,532	2,269
% of total pollock catch by sector	12	8	4	7	8	8	6	9	19	13	12	7	4	5	7
Pacific Cod	772	576	890	783	1,753	1,300	1,671	2,941	323	1,183	495	685	650	1,750	1,544
Arrowtooth Flounder	142	121	222	305	383	845	626	249	767	300	301	596	536	1,050	1,307
Atka Mackerel	21	20	11	81	305	51	11	45	4	13	1	1	23	10	0
Greenland Turbot	43	26	10	19	10	2	0	0	1	5	1	3	0	1	0
'Other' Flatfish	245	120	43	27	176	174	84	159	628	1,066	745	1,178	1,128	1,281	2,846
'Other' Species	19	11	17	27	23	20	86	48	4	5	0	0	0	0	0
Rockfish	9	31	1	29	23	5	0	2	4	10	48	146	326	197	90
Sablefish	2	3	5	1	35	12	19	2	7	0	0	0	0	1	2
<b>Total pollock catch</b>	<b>19,215</b>	<b>18,238</b>	<b>18,929</b>	<b>16,384</b>	<b>23,266</b>	<b>19,125</b>	<b>14,779</b>	<b>13,006</b>	<b>19,192</b>	<b>18,765</b>	<b>17,261</b>	<b>18,789</b>	<b>17,710</b>	<b>31,264</b>	<b>30,803</b>

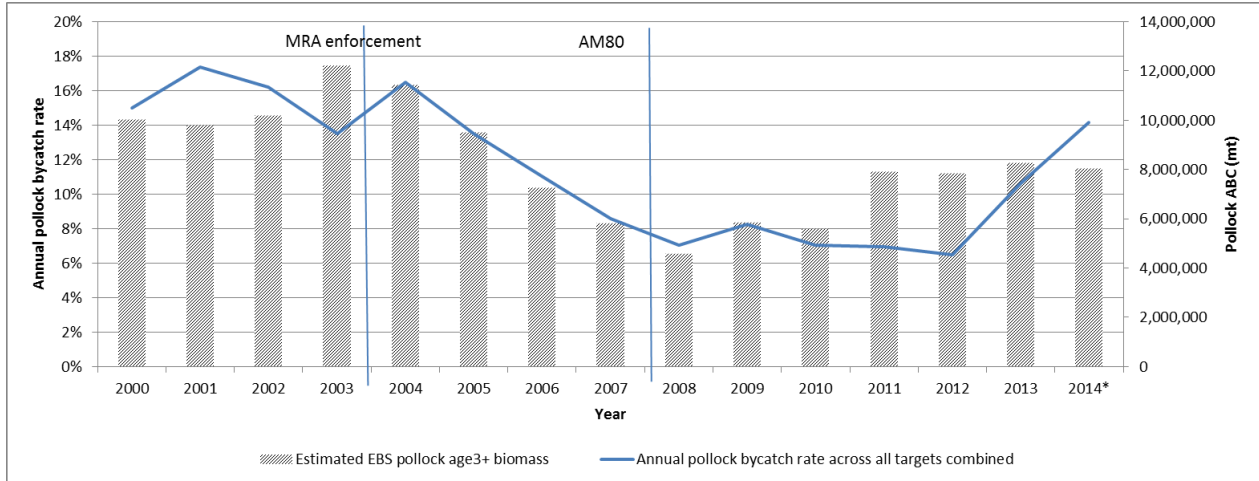
Source: AKFIN. Catch data is from a80\_haul(11-03) file.  
\* 2014 data as of Nov 3.

Table 4 provides the average annual rate of incidental catch of BS pollock for the Amendment 80 sector at the haul level. The table also provides the annual pollock incidental catch rate across all targets and the incidental catch rate of pollock for each target from 2000 through November 3, 2014. Target calculations for pollock by the Catch Account System should result in incidental catch rates of pollock in the pollock target greater than 50 percent, and the data show that during 2000 through November 3, 2014, the average annual incidental catch rate for pollock in the pollock target by the Amendment 80 sector was greater than 50 percent each year, and the average incidental catch rate from 2000 through November 3, 2014 was 55 percent. In non-pollock targets, pollock incidental rates should be less than 50 percent, and the data show that this is the case. The highest average incidental catch rate of pollock amongst the non-pollock targets from 2000 through November 3, 2014 was Pacific cod target at 15 percent. Table 4 also shows that the annual average pollock incidental catch rate across all targets ranged from a low of 7 percent in 2008, 2010, and 2011 to a high of 17 percent in 2001. As reflected in Figure 2, annual pollock incidental catch rate across all targets for the Amendment 80 sector appears to show a similar trend when compared to the estimated pollock age 3+ biomass from 2003 through 2012, but in 2013 and 2014 the incidental catch rate increased while the pollock age 3+ biomass remained relative the same as the previous two years.

**Table 4 Average annual incidental catch rate of BS pollock by haul target for the Amendment 80 sector from 2000 through October 2014**

Haul target species	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014*	Haul target average of pollock bycatch
Pollock	54%	50%	52%	50%	50%	52%	55%	55%	57%	57%	60%	56%	60%	59%	56%	55%
Yellowfin Sole	10%	12%	9%	9%	8%	7%	3%	2%	3%	3%	2%	3%	4%	6%	6%	5%
Rock Sole	11%	10%	12%	10%	14%	11%	9%	5%	6%	7%	6%	7%	5%	7%	12%	8%
Flathead Sole	17%	15%	10%	15%	17%	15%	10%	12%	13%	13%	11%	16%	12%	11%	15%	13%
Pacific Cod	15%	14%	17%	14%	15%	15%	18%	23%	9%	17%	8%	9%	9%	12%	19%	15%
Arrowtooth Flounder	5%	4%	7%	10%	11%	16%	17%	13%	5%	2%	5%	4%	3%	9%	12%	6%
Atka Mackerel	13%	32%	9%	5%	10%	3%	1%	3%	1%	4%	2%	3%	3%	7%	6%	5%
Greenland Turbot	4%	3%	2%	4%	3%	3%	1%	0%	1%	5%	1%	0%	0%	1%	0%	2%
'Other' Flatfish	9%	22%	7%	7%	21%	26%	9%	7%	5%	7%	5%	4%	8%	8%	18%	8%
'Other' Species	7%	13%	8%	7%	6%	17%	18%	18%	5%	10%	0%	n/a	n/a	n/a	n/a	11%
Rockfish	3%	13%	1%	11%	9%	4%	0%	2%	3%	2%	1%	2%	6%	4%	13%	4%
Sablefish	3%	3%	9%	10%	18%	9%	35%	6%	8%	0%	n/a	n/a	1%	1%	13%	10%
<b>Annual pollock bycatch rate across all targets combined</b>	<b>15%</b>	<b>17%</b>	<b>16%</b>	<b>14%</b>	<b>16%</b>	<b>13%</b>	<b>11%</b>	<b>9%</b>	<b>7%</b>	<b>8%</b>	<b>7%</b>	<b>7%</b>	<b>6%</b>	<b>11%</b>	<b>14%</b>	<b>10%</b>

Source: AKFIN. Catch data is from a80\_haul(11-03) file.  
\* 2014 data as of Nov 3.



**Figure 2 Average annual bycatch rate of incidental BS pollock for the Amendment 80 sector and pollock ABC from 2000 through October 2014**

*Amendment 80 pollock spatial analysis*

The next section provides a spatial analysis of observer haul information. Using Amendment 80 catcher processor observer data, the species composition, the location, and the time of each haul was collected. To identify high pollock catch the species composition data on sampled hauls was used to identify hauls with 40%, 50%, 60%, and 70% pollock in relation to total groundfish. The Euclidean distance and the time between each hauls were also calculated. The hauls with high catches of pollock were linked to prior hauls for further analysis described below.

Figure 3 is a simple overlay map showing all hauls with less than 50% pollock and hauls with greater than 50% pollock from 2008 through 2014. The areas with greater than 50% pollock that also have an abundance of hauls less than that amount are included. This may indicate areas where hauls with high pollock catch are really incidental catch and are not identified as “top-off” areas or areas where the fishing is not likely a result of targeted pollock fishing.

Areas that show primarily greater than 50% pollock without an abundance of hauls less than that amount appear to indicate “top-off” fishing behavior in a specific area. The area circled in red was identified as an area for further analysis as it appears to be a potential “top-off” fishing area. Maps generated for 40%, 50%, 60%, and 70% pollock all showed similar information.

In interpreting these data, some caution is warranted because the spatial information does not identify any change in fishing practices which may result in higher pollock catch. For example a vessel could fish gear off the bottom to target pelagic schooling fish like pollock. Therefore this analysis only identifies areas where there is only targeted pollock fishing and does not identify all potential targeting of pollock.

Further analysis was done on the hauls inside the identified “top-off” location (red circle) in relation to those from areas outside that area. It was identified that not every Amendment 80 catcher processor has fished in this area and vessels that fish in this area are from the same companies. Analysis of the distance traveled between hauls also shows a difference in fishing behavior. The average distance traveled between hauls in areas outside the “top-off” area is 27 kilometers (km) compared to the hauls in areas inside the “top-off” area that is approximately 75 km. This indicates that vessels are traveling longer distance to “top-off” on pollock than normal fishing behavior. A Getis-ord Gi hotspot analysis was also conducted and it showed that the area circled in red is a statistically significant hotspot of high pollock in relation to other areas.

## 2008 - 2014 Hauls by Amendment 80 Catcher Processors

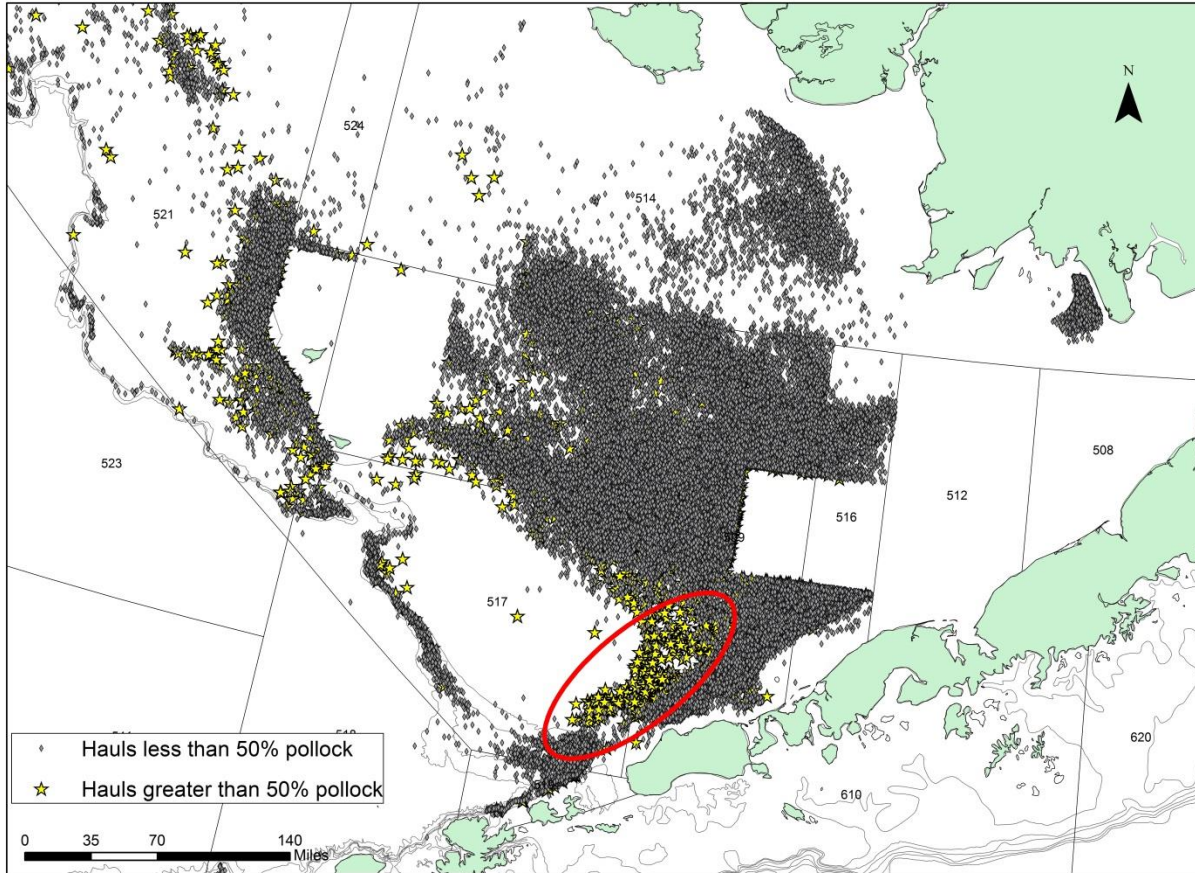


Figure 3 Location of Amendment 80 hauls with less than and greater than 50% pollock from 2008 through 2014

### AFA Vessels

#### *Background*

The AFA was signed into law during the fall of 1998. The purpose of the AFA was to tighten U.S. ownership standards that have been exploited under the Anti-reflagging Act, and provide the BSAI pollock fleet the opportunity to conduct their fishery in a more rational manner while protecting non-AFA participants in other fisheries. The AFA established the allocation of BSAI pollock quota among sectors. The Community Development Quota (CDQ) Program allocation of pollock total allowable catch is 10 percent. After setting aside the incidental catch allowance (ICA), the remaining pollock quota, 40 percent is allocated to the C/Ps, 50 percent is allocated to the inshore sector, and 10 percent is allocated to the motherships. The AFA specifically lists 20 C/Ps eligible to participate in the offshore pollock fishery. In addition, an Amendment 80 vessel (Ocean Peace) met the requirements in the AFA that allows it to harvest and process up to 0.5 percent of the directed BSAI pollock allocation to C/Ps.

Prior to the implementation of the Amendment 80 Program in 2008, BSAI yellowfin sole, rock sole and flathead sole were managed as limited access fisheries. Of these groundfish species, the AFA sectors focused their effort on only yellowfin sole and any rock sole and flathead sole catch was incidental to the yellowfin sole fishery. Since 2003, NMFS has prohibited directed fishing for rock sole by listed AFA C/Ps based on the rock sole sideboard limit. Recognizing AFA vessels tended to target yellowfin sole and not rock sole and flathead sole, the Council, when the developing the Amendment 80 Program, allocated

yellowfin sole to the BSAI trawl limited access sector, which includes the AFA vessels. In addition, when the yellowfin sole TACs exceeds 125,000 mt, AFA sideboard limits for BSAI yellowfin sole do not apply. The BSAI trawl limited access fishery for yellowfin sole receives specific apportionments of PSC species for halibut, king crab and tanner crab, and other PSC species. Since the AFA sectors do not have an exclusive privilege to harvest a predetermined quantity of yellowfin sole, the various AFA sectors must engage in a race for fish if they want to maximize their revenues from this fishery. In addition, since AFA sectors were not allocated rock sole or flathead sole, these species are MRA fisheries for the AFA sectors.

*Data Summary*

Table 5 provides information on BSAI rock sole ABC, retained and discarded catch of BS rock sole, total catch of BS rock sole, and the percent of BS rock sole discarded by all AFA vessels from 2000 through November 3, 2014. As seen in the table, total catch of BS rock sole prior to 2009 was less than 4,000 mt and in some years was below 2,000 mt. In 2009, catch of rock sole increased to nearly 10,000 mt followed by a decline to nearly 2,000 mt the following year. In the subsequent four years since 2009, rock sole catch increased to over 10,000 mt and then declined to less than 8,000 mt. This trend in total catch is reflected in Figure 4 and Figure 5, which shows retained and discarded catch of rock sole by AFA vessels along with rock sole ABC in Figure 4 and annual total yellowfin sole catch by AFA vessels in Figure 5. Also seen in the figures is a week correlation between rock sole catch by the AFA sectors and rock sole ABC and yellowfin sole total catch by AFA vessels. Finally, from 2000 through October 15, 2014, the percent of rock sole discards by AFA vessels has diminished from a high of 71 percent in 2005 to a low of 16 percent in 2014.

**Table 5 Annual BSAI rock sole ABC, total BS rock sole catch, retained and discarded BS rock sole, and percent of BS rock sole discarded by AFA vessels**

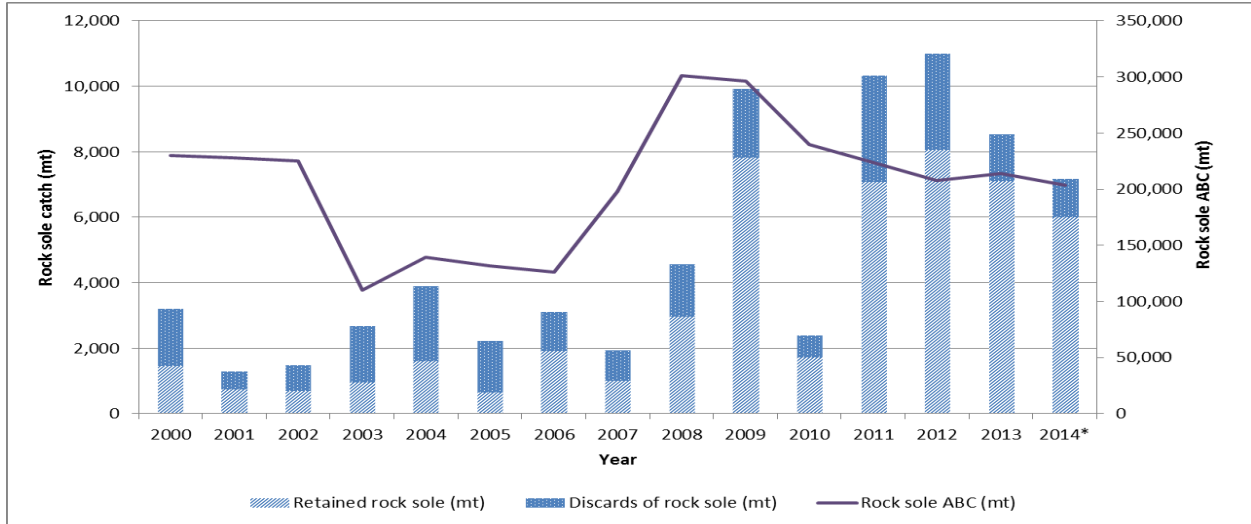
Year	Rock sole ABC (mt)	Total rock sole catch by AFA vessels (mt)	Retained rock sole by AFA vessels (mt)	Discards of rock sole by AFA vessels (mt)	% of rock sole discarded by AFA vessels
2000	230,000	3,203	1,462	1,741	54
2001	228,000	1,294	735	558	43
2002	225,000	1,468	689	779	53
2003	110,000	2,665	943	1,722	65
2004	139,000	3,903	1,590	2,313	59
2005	132,000	2,223	638	1,585	71
2006	126,000	3,099	1,913	1,186	38
2007	198,000	1,930	999	932	48
2008	301,000	4,562	2,965	1,597	35
2009	296,000	9,914	7,818	2,096	21
2010	240,000	2,389	1,727	662	28
2011	224,000	10,318	7,073	3,245	31
2012	208,000	10,986	8,049	2,938	27
2013	214,000	8,534	7,106	1,428	17
2014*	203,800	7,171	5,992	1,179	16

Source: AKFIN. Catch data is from afa\_a80\_rd(10-17) w/o Ocean Peace file.

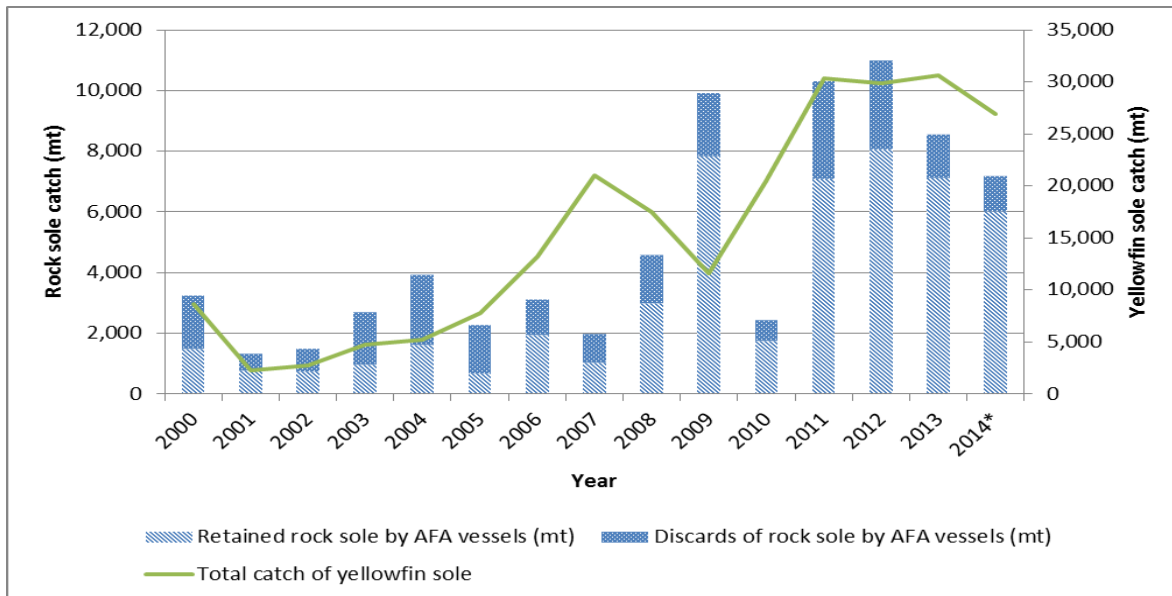
The vessel Ocean Peace has been removed from the data since its rock sole catch is counted against its AM80 allocation

\* 2014 data as of Nov 3.





**Figure 4 BSAI rock sole ABC (mt), annual retained and discarded BS rock sole (mt) by the AFA vessels from 2000 through November 3, 2014**



**Figure 5 Annual retained and discarded catch of BS rock sole (mt) and annual total BS yellowfin sole catch (mt) by AFA vessels from 2000 through November 3, 2014**

Table 6 provides information on BSAI flathead sole ABC, retained and discarded catch of BS flathead sole, total catch of BS flathead sole, and the percent of BS flathead sole discarded by all AFA vessels from 2000 through November 3, 2014. As noted in the table, total catch of BS flathead sole by AFA vessels ranged from a low of 1,186 mt in 2002 to a high 5,244 mt in 2011. From 2000 through 2002, total catch of flathead sole tended to be around 1,000 mt. Starting in 2003, total catch of flathead sole by the AFA vessels started increasing every year reaching nearly 5,000 mt in 2009. In the subsequent years since 2009, total catch of flathead sole by the AFA vessels has generally been between 4,000 mt and 5,000 mt. Most of the increase in total catch of flathead sole was from retained catch. This trend in total catch and retained catch is reflected in Figure 6, which shows retained and discarded catch along with flathead sole ABC from 2000 through November 3, 2014.

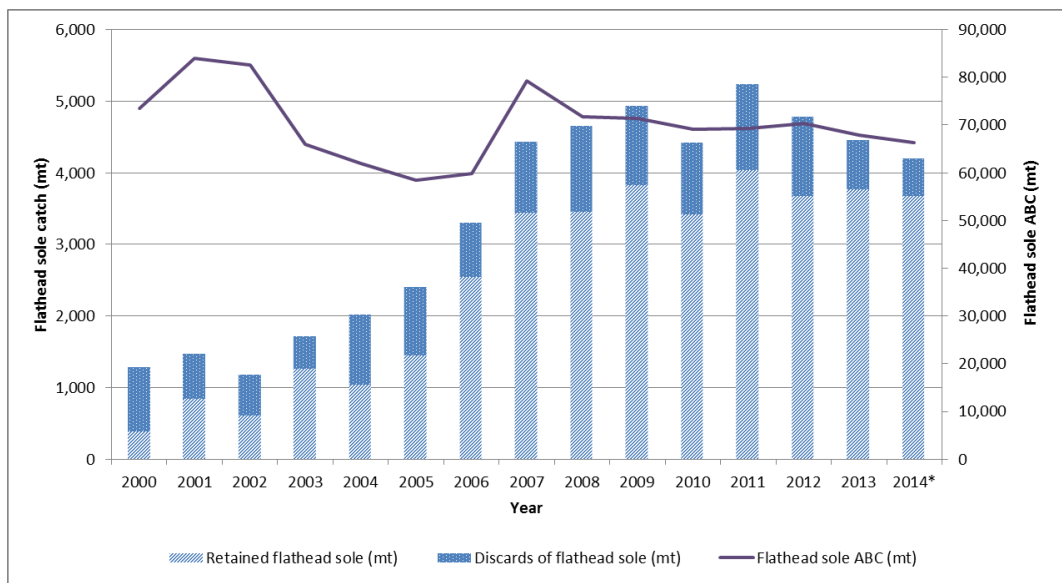
**Table 6 Annual BSAI flathead sole ABC, total BS flathead sole catch, retained and retained BS flathead sole, and percent of BS flathead sole discarded by AFA vessels**

Year	Flathead sole ABC (mt)	Total flathead sole catch by AFA vessels (mt)	Retained flathead sole by AFA vessels (mt)	Discards of flathead sole by AFA vessels (mt)	% of flathead sole discarded by AFA vessels
2000	73,500	1,285	398	887	69
2001	84,000	1,482	847	635	43
2002	82,600	1,186	611	576	49
2003	66,000	1,723	1,264	459	27
2004	61,900	2,027	1,049	977	48
2005	58,500	2,415	1,451	965	40
2006	59,800	3,305	2,544	760	23
2007	79,200	4,433	3,446	987	22
2008	71,700	4,660	3,455	1,205	26
2009	71,400	4,933	3,827	1,107	22
2010	69,200	4,421	3,425	996	23
2011	69,300	5,244	4,047	1,197	23
2012	70,400	4,792	3,677	1,115	23
2013	67,900	4,458	3,768	690	15
2014*	66,293	4,208	3,675	534	13

Source: AKFIN. Catch data is from afa\_a80\_rd(10-17) w/o Ocean Peace file.

The vessel Ocean Peace has been removed from the data since its flathead sole catch is counted against its AM80 allocation

\* 2014 data as of Nov 3.



**Figure 6 BSAI flathead sole ABC (mt), annual retained and discarded BS flathead sole (mt) by the AFA vessels from 2000 through November 3, 2014**

Table 7 provides the annual number of trawl hauls in the BS by target for the AFA sectors from 2000 through November 3, 2014. As seen from the table, the total number of hauls calculated as rock sole targets has increased over the last four of the last five years relative to the previous nine years. The number of AFA trawl hauls calculated as rock sole has ranged from zero in 2003 and 2004 to a high of 188 hauls in 2013. As a percent of total hauls for the AFA sectors in 2013 and 2014, rock sole accounted for nearly 2 percent of the total hauls for both years. Looking at the total number of hauls calculated as flathead sole, very few of the hauls were flathead sole with the exception of 2013 with 79 hauls calculated as flathead sole targets and 2014 with 107 hauls calculated as flathead sole targets. As a percent of total hauls for each year, flathead sole amounted to less than one percent every year except 2014, with slightly over one percent.

**Table 7 Annual number of AFA trawl hauls in the BS by target from 2000 through November 3, 2014**

Haul target species	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Rock sole	66	21	8	0	0	0	51	30	75	119	8	112	166	188	167
% of total annual hauls	0.74	0.20	0.08	0.00	0.00	0.00	0.47	0.27	0.86	1.72	0.12	1.06	1.76	1.99	2.06
Flathead sole	0	0	0	0	0	0	16		10	11	12	11	26	79	107
% of total annual hauls	0	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.11	0.16	0.19	0.10	0.28	0.84	1.32
Pollock	8,440	10,552	10,420	10,763	10,750	10,237	10,367	10,306	8,066	6,406	5,806	9,256	7,930	7,812	6,962
Yellowfin sole	304	103	70	130	102	207	356	509	525	348	533	968	1,100	1,102	574
Other' flatfish	24	0	0	0	0	30	124	140	59	40	39	152	125	195	149
Pacific cod	137	27	0	0	0	0	0	0	6	10	3	17	86	67	159
Greenland Turbot	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arrowtooth Flounder	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rockfish	0	0	0	3	0	0	0	0	0	0	0	6	3	3	0
<b>Total</b>	<b>8,977</b>	<b>10,709</b>	<b>10,498</b>	<b>10,896</b>	<b>10,852</b>	<b>10,474</b>	<b>10,914</b>	<b>10,985</b>	<b>8,741</b>	<b>6,934</b>	<b>6,401</b>	<b>10,522</b>	<b>9,436</b>	<b>9,446</b>	<b>8,118</b>

Source: AKFIN. Catch data is from haul\_tgts(10-15)-1 w/o Ocean Peace file.  
The vessel Ocean Peace has been removed from the data since they are both AFA and AM80 authorized

Table 8 provides annual incidental catch of BS rock sole by haul target for the AFA vessels from 2000 through November 3, 2014. As noted in the table, the largest amount of incidental catch of rock sole was in the pollock target fishery followed by the rock sole target fishery and the yellowfin sole target fishery. Incidental catch of rock sole in the pollock target fishery fluctuated widely. In 2007, incidental catch of rock sole was only 300 mt, while in 2011 incidental catch of rock sole was 6,428 mt. At the same time, incidental catch of rock sole in the calculated rock sole target was relatively small during 2001 through 2007, but then increased significantly over the next six of the seven years since 2007. Incidental catch of rock sole in the yellowfin sole target fishery tended to be similar to the rock sole target fishery, with relatively little incidental catch of rock sole during 2001 through 2007, but then increased in the six of the seven years since, although not to the level of rock sole target fishery. Looking at total incidental catch of rock sole across all the targets for the AFA vessels, there appears to be a significant increase in the incidental catch of rock sole starting in 2008 relative to the previous seven years. The one exception was 2010, when incidental catch of rock sole diminished significantly.

**Table 8 AFA annual incidental catch of BS rock sole by haul target from 2000 through November 3, 2014**

Haul target species	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Rock sole	657	98	30	4	0	7	339	132	735	1,265	78	1,074	3,993	2,688	2,061
% of total annual incidental catch of rock sole	19	7	2	0	0	1	16	14	21	21	6	13	37	34	34
Pollock	2,215	988	1,490	986	2,091	825	798	300	1,500	3,868	1,009	6,428	5,100	4,678	3,226
Yellowfin sole	477	297	34	4	16	102	478	273	1,080	877	207	598	555	410	544
Flathead sole	0	0	1	0	0	0	61	1	26	25	17	8	32	29	42
Other' flatfish	24	2	14	0	6	38	285	250	150	61	53	188	60	123	142
Pacific cod	97	20	20	3	1	115	131	1	7	1	0	30	44	60	126
Greenland Turbot	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arrowtooth Flounder	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rockfish	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>3,472</b>	<b>1,405</b>	<b>1,590</b>	<b>997</b>	<b>2,116</b>	<b>1,088</b>	<b>2,091</b>	<b>958</b>	<b>3,498</b>	<b>6,104</b>	<b>1,364</b>	<b>8,326</b>	<b>9,184</b>	<b>7,987</b>	<b>6,142</b>

Source: AKFIN. Catch data is from afa\_rsole\_haul(10-20) w/o Ocean Peace file.  
The vessel Ocean Peace has been removed from the data since they are both AFA and AM80 authorized

Table 9 provides annual incidental catch of BS flathead sole by haul target for the AFA vessels from 2000 through November 3, 2014. As seen in the table, incidental catch of flathead sole by the AFA vessels occurred primarily in the pollock target followed by the yellowfin sole and flathead sole targets. In general, the amount of incidental catch of flathead sole in the pollock target tended to be consistent each year, while incidental catch of flathead sole in the yellowfin sole and rock sole targets was nearly nonexistent prior to 2006, but has increased in the years since. Overall, total incidental catch of flathead sole by the AFA vessels tended to range 1,200 mt to 1,500 mt from 2000 to 2005, but then started

increasing in 2006. Since 2008, total incidental catch of flathead sole by AFA vessels has tended to range between 3,000 mt to nearly 4,000 mt.

**Table 9 AFA annual incidental catch of BS flathead sole by haul target from 2000 through November 3, 2014**

Haul target species	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Flathead sole	0	0	5	0	0	0	114	17	68	42	85	59	182	776	919
% of total annual incidental catch of flathead sole	0.0	0.0	0.4	0.0	0.0	0.0	5.9	0.7	2.3	1.4	2.6	1.5	4.8	20.0	28.8
Pollock	1,436	1,568	1,313	1,147	1,339	1,328	1,505	2,280	2,533	2,521	2,784	3,343	2,812	2,253	1,545
Yellowfin Sole	3	3	6	11	8	20	186	125	262	274	309	428	582	510	518
Rock sole	5	0	2	0		4	75	25	124	139	2	42	111	146	41
'Other' Flatfish	1	0	2	1	1	7	40	74	26	39	65	74	85	175	141
Pacific Cod	22	8	11	4	0	79	29	1	2	1	0	3	10	7	20
Greenland Turbot	0	0	0	0	0	0	0	0	0	0	0	1		0	1
Arrowtooth Flounder	0	0	0	0	0	0	0	0	0	0	0	7	19	14	9
Rockfish	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>1,469</b>	<b>1,580</b>	<b>1,340</b>	<b>1,163</b>	<b>1,349</b>	<b>1,442</b>	<b>1,950</b>	<b>2,524</b>	<b>3,016</b>	<b>3,017</b>	<b>3,246</b>	<b>3,956</b>	<b>3,800</b>	<b>3,882</b>	<b>3,194</b>
Source: AKFN. Catch data is from afa_fsol_haul(10-20) w/o Ocean Peace file.															
The vessel Ocean Peace has been removed from the data since they are both AFA and AMBO authorized															

Table 10 and Table 11 provides the average annual rate of incidental catch of BS rock sole and flathead sole for the AFA vessels at the haul level. Also included in the table is the annual rock sole and flathead sole incidental catch rate across all targets and the incidental catch rate for each target from 2000 through November 3, 2014. Information gleaned from the tables shows that incidental catch rate for rock sole and flathead sole are the highest in their respective targets, while the incidental catch rates for these two species are much smaller in the other targets. The average incidental catch rate for rock sole from 2000 through November 3, 2014 was 44 percent, while for flathead sole during the same period was 28 percent. Average incidental catch rates for rock sole in other targets ranged from zero percent to four percent, while for flathead sole the average incidental catch rates ranged from zero percent to 2 percent.

**Table 10 Average annual incidental catch rate of BS rock sole by haul target for AFA vessels from 2000 through November 3, 2014**

Haul target species	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Trip target average of rocksole bycatch
Rock sole	41%	23%	18%	96%	0%	33%	21%	19%	31%	32%	38%	37%	60%	48%	56%	44%
Pollock	4%	1%	2%	2%	4%	2%	1%	1%	2%	5%	2%	6%	5%	6%	5%	4%
Yellowfin sole	5%	11%	1%	0%	0%	1%	3%	1%	6%	7%	1%	2%	2%	1%	3%	2%
Flathead sole	0%	0%	7%	0%	0%	0%	12%	4%	9%	12%	5%	4%	4%	1%	1%	3%
Other' flatfish	6%	10%	4%	0%	6%	3%	6%	5%	7%	5%	3%	4%	2%	2%	3%	4%
Pacific cod	5%	3%	3%	2%	2%	5%	7%	1%	9%	1%	0%	8%	2%	4%	4%	4%
Greenland Turbot	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Arrowtooth Flounder	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Rockfish	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
<b>Annual rocksole bycatch rate across all targets combined</b>	<b>1%</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>	<b>1%</b>	<b>1%</b>	<b>0%</b>	<b>1%</b>	<b>1%</b>	<b>1%</b>	<b>1%</b>	<b>1%</b>
Source: AKFN. Catch data is from afa_rsole_haul(10-20) w/o Ocean Peace file.																
The vessel Ocean Peace has been removed from the data since they are both AFA and AMBO authorized																

**Table 11 Average annual incidental catch rate of BS flathead sole by haul target for AFA vessels from 2000 through November 3, 2014**

Haul target species	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Trip target average of flathead sole bycatch
Flathead sole	0%	0%	29%	0%	0%	0%	22%	55%	25%	21%	25%	27%	20%	27%	32%	28%
Pollock	2%	3%	1%	1%	1%	2%	2%	3%	3%	2%	4%	2%	3%	2%	1%	2%
Yellowfin sole	0%	0%	0%	0%	0%	0%	1%	1%	1%	2%	1%	1%	2%	2%	2%	1%
Rock sole	0%	0%	1%	0%	0%	19%	5%	4%	5%	3%	1%	1%	2%	3%	1%	2%
Other' flatfish	0%	0%	0%	1%	1%	1%	1%	2%	1%	3%	4%	2%	3%	3%	3%	2%
Pacific cod	1%	1%	2%	2%	1%	3%	1%	1%	3%	0%	1%	1%	1%	0%	1%	1%
Greenland Turbot	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	1%	3%	1%
Arrowtooth Flounder	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	2%	2%	3%	2%
Rockfish	3%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Annual flathead sole bycatch rate across all targets combined	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	1%	1%	1%	1%	0%	0%
Source: AKFN. Catch data is from afa_fsol_haul(10-20) w/o Ocean Peace file.																
The vessel Ocean Peace has been removed from the data since they are both AFA and AM80 authorized																

*AFA CP rock sole spatial analysis*

This section provides spatial analysis on rock sole catch by AFA catcher processors. Using AFA catcher processor observer data, the species composition, the location, and the time of each haul was collected. To identify high rock sole catch, the species composition data on sampled hauls was used to identify hauls with 40%, 50%, 60%, and 70% rock sole in relation to total groundfish. The Euclidean distance and the time between hauls were also calculated. The hauls with high catches of rock sole were linked to prior hauls for further analysis.

Figure 7 is a simple overlay map showing all hauls by AFA catcher processors using non-pelagic trawl gear with less than 50% rock sole along with hauls with greater than 50% rock sole from 2008 through 2014. The areas with greater than 50% rock sole that also include an abundance of hauls less than that amount are also provided in the figure. This may indicate areas where high rock sole hauls are really incidental catch and are not identified as “top-off” areas or areas where the fishing is not likely a result of targeted rock sole fishing.

Areas that show primarily greater than 50% rock sole without an abundance of hauls less than that amount may identify “top-off” fishing behavior in a specific area. The area circled in red was identified as a potential top off location for further analysis. This area is not as cleanly defined as the Amendment 80 circle but still warrants further analysis.

Further analysis was done on the hauls inside the identified “top-off” location (red circle) in relation to haul outside that area. It was identified that every haul that occurred in the red circle is from 2008 and 2009. Since 2009 there has been no fishing by the AFA catcher processors using non-pelagic trawl gear in that area. This may indicate that AFA catcher processors are avoiding that area. This may be due to multiple factors that cannot be identified but could include avoiding areas with high rock sole and halibut incidental catch.

Analysis of the distance traveled between hauls showed little difference in fishing behavior. The average distance traveled between hauls in areas outside the top-off area is 15 kilometers (km) compared to the hauls in areas inside the top-off area that is approximately 8 km. This indicates that vessels are not traveling longer distances to an area to “top off” on rock sole. A Getis-ord Gi hotspot analysis was also conducted and it showed that the area circled in red is statistically significant hotspot of high rock sole catch in relation to other areas.

Overall AFA catcher processors using non-pelagic trawl gear do not appear to be traveling to specific areas to “top off” on rock sole. However as mentioned in the Amendment 80 section, this analysis does

not identify changes in fishing behavior that may preferentially target rock sole, just identifies locations where this activity may occur.

### 2008 - 2014 Hauls by AFA Catcher Processors using Non-Pelagic Trawl Gear

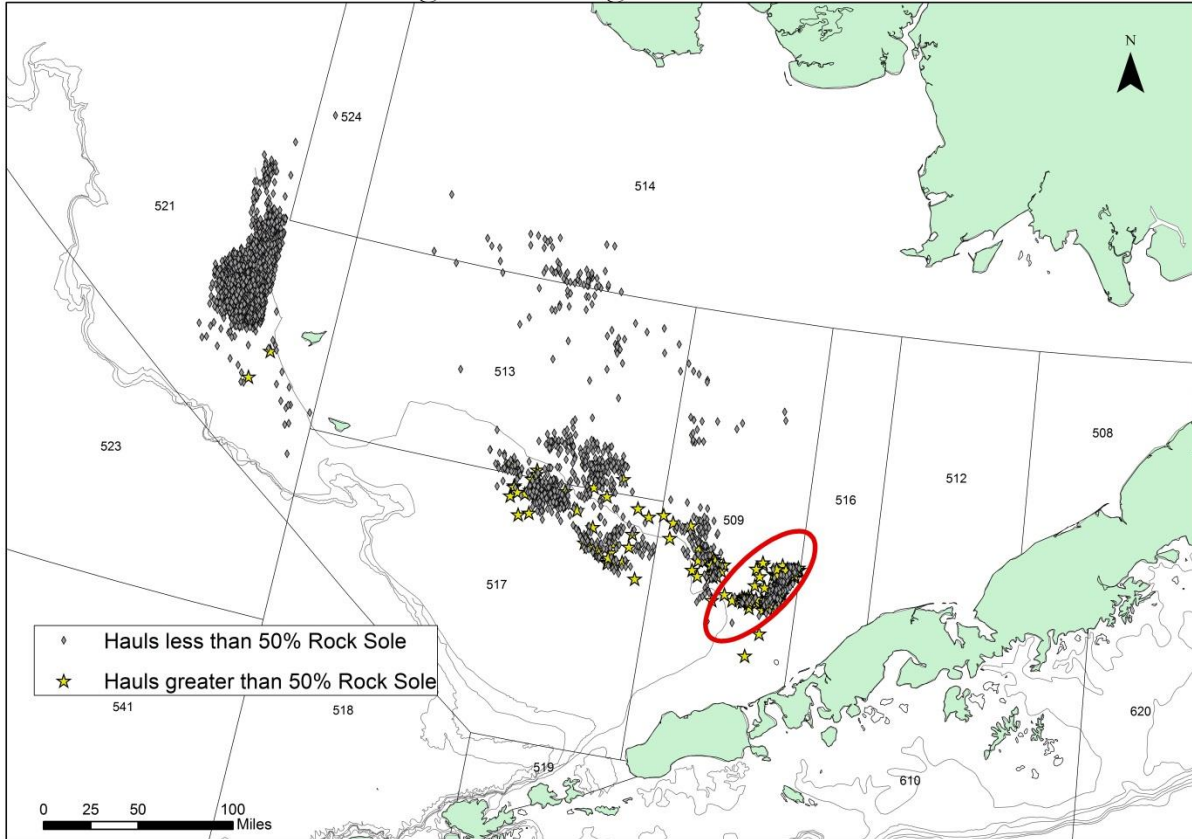


Figure 7 Location of hauls by AFA catcher processors using non-pelagic trawl gear with less than and greater than 50% pollock from 2008 through 2014