TRADEX

SUPPLY MARKET STUDY –
Alaska Pollock Prospects 2008-2011

Market Analysis **February 2008**

Prepared By: Kris Terauds

TABLE OF CONTENTS

1. PREAMBLE

1.1. Disclaimer

The information in this report is for informational purposes only. The conclusions herein are forward looking and represent Tradex Foods' best estimate based on current available information. We have used data from sources we believe to be reliable but we can not guarantee that they are complete or accurate. Although we believe the expectations reflected in our forward-looking statements are reasonable, results may vary, and we cannot guarantee future results.

1.2. Feedback

Tradex Foods welcomes your feedback about this report and our other market analysis offerings. Should you have a comment or question, please contact us:

- Email: tradex@tradexfoods.com
- Phone: 1.877.479.1355

2. EXECUTIVE SUMMARY

2.1. Introduction

- Pollock is the world's most voluminous whitefish fishery, accounting by some estimates for 40% of global whitefish supply.
- As at 2001, seven countries harvested pollock:
  - Canada
  - China
  - Japan
  - Korea
  - Poland
  - Russia
  - USA
- US harvesters accounted for 46% of the global harvest, and Russian harvesters 36%, with Japan and Korea as second tier harvesting nations:

POLLOCK HARVEST, 2001 *all figures in metric tonnes (MT)*		
Country	**Harvest**	**% of total**
Canada	1,747	0.1%
China	39,665	1.3%
Japan	241,881	7.7%
Korea	257,396	8.2%
Poland	16,590	0.5%
Russia	1,145,016	36.4%
USA	1,442,170	45.9%
Total	3,144,465	100.0%

- Due to the dominance of the US and Russian fisheries, and to the relative dearth of data on the Russian fishery, this report will focus exclusively on the US fishery.

2.2. Management

- The North Pacific Fisheries Management Council (NPFMC) governs Alaska's groundfish fisheries, including pollock.
- NPFMC is comprised of industry stakeholders.
- Nominal decision making authority rests with the US Department of Commerce (DOC), although the DOC rarely contradicts NPFMC recommendations.
- The National Marine Fisheries Service (NMFS), a DOC department, manages Alaska's federal fisheries according to NPFMC policies.
- NMFS conducts much of the scientific research used by NPFMC to make its policy decisions.

- NMFS also expresses its opinion on policy questions to NPFMC, meaning it is not a pure operational agency.

2.3. Harvest areas

- NPFMC divides Alaska's pollock fisheries into two large areas:
  - Bering Sea and Aleutian Islands (BSAI)
  - Gulf of Alaska (GOA)
- NMFS manages the two areas quite differently.

1.2.1. BSAI

- The Bering Sea fishery is dominated by the American Fisheries Act (AFA), enacted in 1997.
- The AFA reduced the over-capacity of catcher-processors, granting individual fishing quotas (IFQ) to a subset of the fleet.
- The IFQ system has effectively privatized the pollock fishery, with IFQ owners holding a theoretically perpetual claim to a fixed percentage of the annual pollock quota.
- NPFMC divides the Bering Sea pollock TAC into AFA vessel types:
  - AFA at-sea catcher-processors
  - AFA at-sea mothership processors
  - AFA shore-based catcher vessels

1.2.2. GOA

- NPFMC divides all GOA fisheries into regional sub areas, centered on major islands:
  - 610 (West) Shumagin Islands in the Aleutians
  - 620 (Central) Chirikof Island, west of Kodiak
  - 630 (Central) Kodiak Island, central GOA

2.4. Historical

2.4.1. Harvests

- Pollock harvests reached a peak of approximately 2.8 million MT in 1988-89, due mainly to the unregulated free-for-all in the Donut Hole.
- After the fishing moratorium began in the Donut Hole in 1993, catches in that area disappeared and overall pollock harvests in Alaska subsided to the 1-1.5 million MT range that has continued to the present day.
- At 1.57 million MT, the 2005 harvest was the largest since 1991.

- Harvests have fallen since then, reaching a recent low in 2007.

2.4.2. Quotas

- The Bering Sea pollock fishery is remarkably efficient and consistent, harvesting an average of 99%+ of its annual TAC.
- As such I will use a 99% catch-TAC adjustment factor to predict future BSAI pollock harvests.
- The smaller scale GOA pollock fishery is less efficient than its BSAI counterpart, harvesting an average of 90% of TAC, but is nonetheless consistent.
- I will use a 90% catch-TAC adjustment factor to predict future GOA pollock harvests.

2.5. Forecasts

2.5.1. Current plan (2008-2009)

CATCH PROJECTIONS FOR ALASKAN POLLOCK FISHERIES, 2008-2009
all figures in metric tonnes (MT) unless otherwise noted

		2007		2008 (proj)		2009 (proj)	
Area	Catch/TAC	TAC	Actual catch	TAC	Actual catch	TAC	Actual catch
BSAI	0.99	1,413,000	1,352,488	1,019,000	1,008,810	1,019,000	1,008,810
GOA	0.90	68,307	51,779	60,180	54,162	78,170	70,353
Total		1,481,307	1,404,267	1,079,180	1,062,972	1,097,170	1,079,163

- Concerns about the health of the pollock stock arose in late 2007, causing the NPFMC to set 2008 pollock TACs 27% lower than in 2007.
- This was a shocking turn of events given that the industry began the 2007 fishing season with confidence in the health of Alaska's pollock stocks.
- The above projections show a 2008 harvest approximately 24% lower than the previous year.
- So far the Council has projected no change to the 2009 TAC from the 2008 figure.
- Therefore with a projected rise in the GOA TACs in 2009, we project a very slight 1% increase in statewide catches that year.

2.5.2. Next plan (2010-2011)

- Among the 1995-2000 year classes, all but one year had an above average volume of fish, leading to a string of healthy harvests from 2001 to the present.

- Each of the 2001-2004 year classes were well below the average 1995-2006 volume.
- The 2005 year class was more voluminous again, but still under the average.
- This suggests that the pollock biomass will be at a cyclical low from 2007-2010 before starting to climb again.
- Therefore, since the year class numbers indicate that stocks will fall an additional 15% by 2010, I estimate that TACs will fall by the same amount, or an additional 7.5% per year in 2010 and 2011.

HARVEST PROJECTIONS FOR ALASKAN POLLOCK FISHERIES, 2008-2011
all figures in metric tonnes (MT) unless otherwise noted

Area	2008	2009	2010	2011
BSAI	1,008,810	1,008,810	933,149	863,163
GOA	54,162	70,353	66,000	57,000
Total	1,062,972	1,079,163	999,149	920,163

- Using 2009 projections as a base, I expect that annual pollock harvests will fall to in 1.00 million MT in 2010 and 920,000MT in 2011.
- These numbers are well below harvests in recent years and would be among the lowest pollock harvests in the past 30 years.

3. INTRODUCTION

3.1. Species description[1]

- Scientific name: Theragara chalcogramma
- Common names: Alaska pollock, walleye pollock
- Maximum length: 91cm
- Maximum weight: 1.4kg
- Maximum age: 15 years
- Distribution: North Pacific: Southern Sea of Japan to Alaska, south to Carmel, CA
- Trawl nets can begin to select large two year-old pollock, but the usual harvest age is between three and five years of age.[2]

3.2. Global harvests[3]

- Pollock is the world's most voluminous whitefish fishery, accounting by some estimates for 40% of global whitefish supply.
- As at 2001, seven countries harvested pollock:
  - Canada
  - China
  - Japan
  - Korea
  - Poland
  - Russia
  - USA
- US harvesters accounted for 46% of the global harvest, and Russian harvesters 36%, with Japan and Korea as second tier harvesting nations:

POLLOCK HARVEST, 2001		
all figures in metric tonnes (MT)		
Country	Harvest	% of total
Canada	1,747	0.1%
China	39,665	1.3%
Japan	241,881	7.7%
Korea	257,396	8.2%
Poland	16,590	0.5%
Russia	1,145,016	36.4%
USA	1,442,170	45.9%
Total	3,144,465	100.0%

- Due to the dominance of the US and Russian fisheries, and to the relative dearth of data on the Russian fishery, this report will focus exclusively on the US fishery.

4. MANAGEMENT

4.1. Organizations

- Twelve regional fisheries councils govern the USA's federal fisheries, defined as those that fall between the three mile boundary of states' waters and the 200 mile boundary of the USA's Exclusive Economic Zone (EEZ).
- The North Pacific Fisheries Management Council (NPFMC) governs groundfish fisheries in the federal waters off Alaska's coast.
- NPFMC reviews scientific stock data and recommends quotas and dates for fisheries to the US Department of Commerce (DOC) for approval.
- Although DOC is the government agency ultimately responsible for approving or rejecting NPFMC's proposals, it rarely questions the council's recommendations.
- Once the NPFMC sets policy and the DOC approves it, the National Marine Fisheries Service (NMFS), a DOC agency, manages the fisheries.
- NMFS's management duties include, among other things: managing the licensing of fishing vessels, monitoring vessel activity and landings, monitoring total landings against quota, and announcing fishery openings and closures.
- In addition to its management duties NMFS conducts the bulk of the scientific fisheries research used by NPFMC in its policy decision making.
- NMFS also presents its opinions to NPFMC on issues for which NMFS has a desired policy in mind. This means that NMFS is not a pure operating agency, but has a governance role as well.

4.2. Process

- NMFS collects data from both ongoing monitoring and periodic studies, compiling them into stock assessments for individual species.
- Over the years NMFS has refined its modelling, so stock assessments in earlier years may have been calculated using a different model and different variables.
- These stock assessments are the foundation on which NPFMC and other policy makers determine the current and future health of the stock and decide on appropriate conservation and/or harvesting policies.

- Presently NPFMC creates a biennial plan for the Alaskan pollock fisheries.
- The current plan covers 2008-2009.

4.3. Key stock assessment data

- NMFS's stock assessments lay out an upper and lower projection of biomass for the year. The average of these two outliers is usually quoted as the estimated biomass for the year, although actual results vary substantially within the upper and lower limit.
- From that figure NPFMC determines the Overfishing Level (OFL), past which the species would be considered to be overfished.
- An Allowable Biological Catch (ABC) is set below the OFL with sufficient buffer room in the case of a lower than expected biomass and/or a higher than expected harvest.
- Using the ABC as an upper limit, NPFMC sets the Total Allowable Catch (TAC), often referred to as "quota."
- NMFS hold a portion of the intended TAC as a reserve to be released to harvesters mid-season on a "wait-and-see" basis.
- Naturally the stock assessments contain myriad other terms including Optimum Yield (OY) and Domestic Annual Harvest (DAH), but this report will focus on ABC, TAC and actual catches of pollock.

4.4. Stellar sea lions

- As a pelagic trawl, the pollock fishery does not cause the same ocean floor damage as bottom trawl groundfish fisheries, nor does it have the same bycatch rate of other finfish species.
- The pollock fishery's main negative ecological impact is its effect on Stellar sea lions, whose primary food is pelagic fish such as pollock and Atka mackerel.
- Although the issue remains contentious, the fishery has acknowledged its negative effect on the Stellar sea lion populations and has endeavored to avoid most identified rookeries in the pollock grounds.
- In the approximately 3 million km^2 of fishing area in Alaska (~1 million km^2 each for the Bering Sea, Aleutian Islands and Gulf of Alaska), some 387,000km^2 are recognized as critical Stellar sea lion habitat.
- Of this 387,000km^2, currently 210,000km^2 are off-limits to mid-water trawl fisheries such as pollock and Atka mackerel.
- It is likely that the effect of Stellar sea lion conservation on the pollock fishery will remain fluid.

4.5. Salmon

- Salmon also swim in the midwater and at times mix with pollock schools.
- The Bering Sea pollock fishery has dealt with salmon bycatch in the past, as evidenced by a salmon conservation area where pollock fishing is restricted.
- But in recent years salmon bycatch has risen steadily, with the 2007 bycatch the highest on record.[4]
- Chum salmon end up in the pollock nets but the salmon industry is most concerned about the chinook salmon.
- Chinook salmon are the largest and rarest of the Pacific salmon species.
- They are also considered excellent eating fish and therefore fetch the highest price per pound of the salmon species.
- In addition chinook are the most prized salmon species for recreational fishermen and salmon fishing charters.
- Many communities on the Pacific coast rely on chinook and other salmon species for subsistence fisheries.
- Therefore in its February, 2008 meeting, the NPFMC made adjustments to an ongoing motion to establish salmon bycatch restrictions on the Bering Sea pollock fishery.[5]
- The Council will have a final regulation ready at one of its future meetings, but this regulation will no doubt alter the conduct of the fishery to some degree, possibly even restricting the amount of pollock that can be caught in a year.

4.6. Harvest areas

- NPFMC divides Alaska's pollock fisheries into two large areas:
  - Bering Sea and Aleutian Islands (BSAI)
  - Gulf of Alaska (GOA)
- NMFS manages the two areas quite differently.
- In addition the "Donut Hole" area in international waters played an important role in the fishery in the late 1980s and early 1990s.

4.6.1. BSAI

- The BSAI is by far the most important area for pollock in Alaska and the world.

- The BSAI area is a combination of two large, distinct areas: the East Bering Sea (EBS) and the Aleutian Islands (AI), with the main pollock fishing grounds in the Bering Sea.
- The Bering Sea fishery is dominated by the American Fisheries Act (AFA), enacted in 1997.
- The AFA reduced the over-capacity of catcher-processors, granting individual fishing quotas (IFQ) to a subset of the fleet. The Act also allowed quota owners to form cooperatives.
- The IFQ system has effectively privatized the pollock fishery, with IFQ owners holding a theoretically perpetual claim to a fixed percentage of the annual pollock quota.
- IFQ owners may sell their stakes, which has led to significant consolidation and barriers to entry.
- NPFMC divides the Bering Sea pollock TAC into AFA vessel types:
    - AFA at-sea catcher-processors
    - AFA at-sea mothership processors
    - AFA shore-based catcher vessels
- In 2006 NMFS created a smaller TAC in the Aleutian Islands, but it was not pursued in the past two seasons.

4.6.2. GOA

- GOA pollock fisheries produce much lower volumes than the BSAI fisheries.
- NPFMC divides all GOA fisheries into regional sub areas, centered on major islands:
    - 610 (West) Shumagin Islands in the Aleutians
    - 620 (Central) Chirikof Island, west of Kodiak
    - 630 (Central) Kodiak Island, central GOA
- Although managed as a “groundfish,” pollock is a pelagic fish, which means that the GOA pollock fishery is not as troubled as other groundfish fisheries in the area.
- Specifically:
    - The GOA pollock stock has not been overfished to the same degree as other groundfish stocks, meaning the fishery consistently harvests its quota.
    - Tight halibut mortality quotas in the GOA routinely close bottom trawl fisheries for groundfish, but as a pelagic trawl, the pollock fishery does not suffer these closures.

- Since the late 1990s NPFMC has been slowly pursuing a rationalization of GOA groundfish fisheries, although the pelagic pollock fisheries are not central to this ongoing effort.

4.6.3. "Donut Hole"[6]

- Prior to the mid-1980s, fishing vessels from Japan, the USSR, Taiwan, Korea and Poland participated in the US pollock fishery.
- In 1978 the USA began the "Americanization" of the fishery. In 1986 it banned all non-joint venture vessels (i.e. foreign owned vessels), and by 1988 US vessels accounted for nearly 100% of the harvest.
- As a result, foreign vessels began to fish in the small circular area of international water in the Bering Sea that lies outside the EEZ of US and Russian waters. This area is known as the "Donut Hole."
- With the overcapacity of foreign factory ships suddenly focused on this small unregulated area, pollock harvests soared in gold rush fashion (i.e. lucrative but quickly exhausted). The harvest in this small area reached 1.4 million MT in 1988 and 1989, before crashing to 293,000MT in 1992.
- After only eight years of fishing in the Donut Hole, the countries involved implemented a fishing moratorium there in 1993.

5. HISTORICAL

5.1. Harvests[7,8]

- NMFS reports the following landings for pollock from 1981-2007:

POLLOCK LANDINGS, 1981-2007
all figures in metric tonnes (MT) unless otherwise noted

	BSAI							
Year	EBS	Aleutians	Donut Hole	Bogoslof Isl.	Total BSAI	GOA	Total	Yearly change (%)
1981	973,502	55,517			1,029,019	147,744	1,176,763	
1982	955,964	57,753			1,013,717	168,740	1,182,457	0.5%
1983	981,450	59,021			1,040,471	215,608	1,256,079	6.2%
1984	1,092,055	77,595	181,200		1,350,850	307,401	1,658,251	32.0%
1985	1,139,676	58,147	363,400		1,561,223	284,286	1,845,509	11.3%
1986	1,141,993	45,439	1,039,800		2,227,232	87,809	2,315,041	25.4%
1987	859,416	28,471	1,326,300	377,436	2,591,623	69,751	2,661,374	15.0%
1988	1,228,721	41,203	1,395,900	87,813	2,753,637	65,739	2,819,376	5.9%
1989	1,229,600	10,569	1,447,600	36,073	2,723,842	78,392	2,802,234	(0.6%)
1990	1,455,193	79,025	917,400	151,672	2,603,290	90,744	2,694,034	(3.9%)
1991	1,195,646	98,604	293,400	316,038	1,903,688	100,488	2,004,176	(25.6%)
1992	1,390,331	52,352	10,000	241	1,452,924	90,857	1,543,781	(23.0%)
1993	1,326,601	57,132	1,957	886	1,386,576	108,908	1,495,484	(3.1%)
1994	1,329,350	58,659		556	1,388,565	107,335	1,495,900	0.0%
1995	1,264,245	64,925		334	1,329,504	72,618	1,402,122	(6.3%)
1996	1,192,778	29,062		499	1,222,339	51,263	1,273,602	(9.2%)
1997	1,124,430	25,940		163	1,150,533	90,130	1,240,663	(2.6%)
1998	1,101,165	23,822		136	1,125,123	125,098	1,250,221	0.8%
1999	989,816	1,010		29	990,855	95,590	1,086,445	(13.1%)
2000	1,132,707	1,244		29	1,133,980	73,080	1,207,060	11.1%
2001	1,387,194	824		258	1,388,276	72,076	1,460,352	21.0%
2002	1,480,195	1,156		1,042	1,482,393	51,937	1,534,330	5.1%
2003	1,490,070	1,653		24	1,491,747	50,666	1,542,413	0.5%
2004	1,480,876	1,150			1,482,026	63,913	1,545,939	0.2%
2005	1,483,271	1,621			1,484,892	80,876	1,565,768	1.3%
2006	1,496,710				1,496,710	70,484	1,567,194	0.1%
2007	1,350,000	2,488			1,352,488	51,779	1,404,267	(10.4%)
Average 1981-2007	1,232,332	35,938	697,696	57,249	1,561,390	106,419	1,667,809	1.5%
Average 2000-2007	1,412,628	1,448		338	1,414,064	64,351	1,478,415	3.6%

- Pollock harvests reached a peak of approximately 2.8 million MT in 1988-89, due mainly to the unregulated free-for-all in the Donut Hole.
- After the fishing moratorium began in the Donut Hole in 1993, catches in that area disappeared, and overall pollock harvests in Alaska subsided to the current 1-1.5 million MT range.

- Since 1991 marked the most recent trough in spawning biomass, the subsequent years until 1999 showed a slow decline in catches, to a recent low of 1.1 million MT in 1999.
- From that point catches have risen steadily to more than 1.5 million MT per year.
- At 1.57 million MT, the 2005 harvest was the largest since 1991.

5.2. Quotas

- Before analysing NPFMC's 2008 stock projections, we must review how closely previous stock assessments indicated eventual actual landings.

5.2.1. BSAI[7,8]

- The following table shows catch data for the eastern Bering Sea (EBS).

EBS POLLOCK ABC, TAC AND CATCH 1981-2007
all figures in metric tonnes (MT) unless otherwise noted

Year	ABC	TAC	TAC as % of ABC	Catch	Catch as % of TAC
1981	1,300,000	1,000,000	76.9%	973,502	97.4%
1982	1,300,000	1,000,000	76.9%	955,964	95.6%
1983	1,300,000	1,000,000	76.9%	981,450	98.1%
1984	1,300,000	1,200,000	92.3%	1,092,055	91.0%
1985	1,300,000	1,200,000	92.3%	1,139,676	95.0%
1986	1,300,000	1,200,000	92.3%	1,141,993	95.2%
1987	1,300,000	1,200,000	92.3%	859,416	71.6%
1988	1,500,000	1,300,000	86.7%	1,228,721	94.5%
1989	1,340,000	1,340,000	100.0%	1,229,600	91.8%
1990	1,450,000	1,280,000	88.3%	1,455,193	113.7%
1991	1,676,000	1,300,000	77.6%	1,195,646	92.0%
1992	1,490,000	1,300,000	87.2%	1,390,331	106.9%
1993	1,340,000	1,300,000	97.0%	1,326,601	102.0%
1994	1,330,000	1,330,000	100.0%	1,329,350	100.0%
1995	1,250,000	1,250,000	100.0%	1,264,245	101.1%
1996	1,190,000	1,190,000	100.0%	1,192,778	100.2%
1997	1,130,000	1,130,000	100.0%	1,124,430	99.5%
1998	1,110,000	1,110,000	100.0%	1,101,165	99.2%
1999	992,000	992,000	100.0%	989,816	99.8%
2000	1,139,000	1,139,000	100.0%	1,132,707	99.4%
2001	1,842,000	1,400,000	76.0%	1,387,194	99.1%
2002	2,110,000	1,485,000	70.4%	1,480,195	99.7%
2003	2,330,000	1,491,760	64.0%	1,490,070	99.9%
2004	2,560,000	1,492,000	58.3%	1,480,876	99.3%
2005	1,960,000	1,478,500	75.4%	1,483,271	100.3%
2006	1,930,000	1,485,000	76.9%	1,467,229	98.8%
2007	1,394,000	1,394,000	100.0%	1,350,000	96.8%
Average 1981-2007	1,487,519	1,258,787	87.3%	1,231,240	97.7%
Average 2000-2007	1,908,125	1,420,658	77.6%	1,408,943	99.2%

- The main point to draw from this table is that until 2007 the pollock ABC has been high enough that the NPFMC could set TAC without constraint.
- For example in 2004 the TAC (quota) was only 58% of the ABC (the limit below which the desired spawning biomass is assured). This means that the NPFMC had the luxury of setting the TAC higher without affecting the desired spawning biomass.
- In all years prior to 2000, the NPFMC had much less leeway in this regard, with TACs ranging from 77-100% of ABC.
- The rising rate of TAC as a % of ABC since 2004 reflects estimates that the pollock biomass hit a peak in 2003 and will contract in the coming years.
- This was apparent in 2007, when the TAC reached 100% of ABC – the economic demands of the fishery once again bumping up against the stock's reproductive capacity.
- We also see that the pollock fishery is extremely efficient, harvesting 99% or more of its annual TAC.
- We can therefore be relatively confident that in the BSAI:
    - NPFMC's ABC numbers will approximately equal the eventual TAC released to fishermen in coming years.
    - Actual catches will approximately equal the TAC in a given year.
- As such I will use a 99% catch-TAC adjustment factor to predict future BSAI pollock harvests.

5.2.2. GOA[7,8]

GOA POLLOCK ABC, TAC AND CATCH 1981-2007 *all figures in metric tonnes (MT) unless otherwise noted*					
Year	ABC	TAC	TAC as % of ABC	Catch	Catch as % of TAC
1981		168,800		147,744	87.5%
1982		168,800		168,740	100.0%
1983		256,600		215,608	84.0%
1984		416,600		307,401	73.8%
1985		305,000		284,286	93.2%
1986		116,000		87,809	75.7%
1987		84,000		69,751	83.0%
1988	93,000	93,000	100.0%	65,739	70.7%
1989	63,400	72,200	113.9%	78,392	108.6%
1990	73,400	73,400	100.0%	90,744	123.6%
1991		103,400		100,488	97.2%
1992	99,400	87,400	87.9%	90,857	104.0%
1993	160,400	114,400	71.3%	108,908	95.2%
1994	109,300	109,300	100.0%	107,335	98.2%
1995	65,360	65,360	100.0%	72,618	111.1%
1996	54,810	54,810	100.0%	51,263	93.5%
1997	79,980	79,980	100.0%	90,130	112.7%
1998	130,000	124,730	95.9%	125,098	100.3%
1999	100,920	94,580	93.7%	95,590	101.1%
2000	100,000	94,960	95.0%	73,080	77.0%
2001	105,810	90,690	85.7%	72,076	79.5%
2002	58,250	53,490	91.8%	51,937	97.1%
2003	54,350	49,590	91.2%	50,666	102.2%
2004	71,260	65,660	92.1%	63,913	97.3%
2005	91,710	86,100	93.9%	80,876	93.9%
2006	86,807	81,300	93.7%	70,484	86.7%
2007	68,307	68,307	100.0%	51,779	75.8%
Average 1981-2007	87,709	117,721	95.1%	106,419	93.4%
Average 2000-2007	79,562	73,762	92.9%	64,351	88.7%

- By contrast with the last few years in BSAI, the NPFMC has not had a buffer between the stock's reproductive needs (ABC) and the fishery's quota (TAC) in the GOA.
- As such, NPFMC has always released 90%+ of the ABC as TAC.
- In particular in 2007 the NPFMC returned to releasing 100% of ABC as TAC for the first time since 1997.
- The smaller scale GOA pollock fishery is less efficient than its BSAI counterpart, harvesting an average of 90% of TAC, but is nonetheless consistent.
- I will use a 90% catch-TAC adjustment factor to predict future GOA pollock harvests.

6. CURRENT PLAN (2008-2009)[8]

- Concerns about the health of the pollock stock arose in late 2007, causing the NPFMC to set 2008 pollock TACs 27% lower than in 2007.
- This was a shocking turn of events given that the industry began the 2007 fishing season with confidence in the health of Alaska's pollock stocks.
- The industry had concerns over the stock health of another major groundfish species – Pacific cod – but these concerns disappeared when the Council released its pollock TAC recommendations.

CATCH PROJECTIONS FOR ALASKAN POLLOCK FISHERIES, 2008-2009
all figures in metric tonnes (MT) unless otherwise noted

		2007		2008 (proj)		2009 (proj)	
Area	Catch/TAC	TAC	Actual catch	TAC	Actual catch	TAC	Actual catch
BSAI	0.99	1,413,000	1,352,488	1,019,000	1,008,810	1,019,000	1,008,810
GOA	0.90	68,307	51,779	60,180	54,162	78,170	70,353
Total		1,481,307	1,404,267	1,079,180	1,062,972	1,097,170	1,079,163

- These projections show a 2008 harvest approximately 24% lower than the previous year.
- So far the Council has projected no change to the 2009 TAC from the 2008 figure.
- Therefore with a projected rise in the GOA TACs in 2009, we estimate a very slight 1% increase in statewide catches that year.

7. NEXT PLAN (2010-2011)

7.1. Age composition and biomass estimates

- In the absence of NPFMC's ABC or TAC projections for 2010-2011, I have chosen to use age composition and biomass estimates from the EBS as an indicator of the proportion of the pollock stock that will fall within the usual harvesting age (3-5 years) and therefore the volume of future catches.

POLLOCK AGE COMPOSITION ESTIMATES FROM THE EBS 1996-2003

all figures in millions of fish unless otherwise noted

	Age												
Year	1	2	3	4	5	6	7	8	9	10	>10	Total	BSAI Catch (MT)
1996	1,317	279	107	213	721	1,047	976	334	84	91	385	5,554	1,192,778
1997	2,152	303	69	77	1,106	759	564	734	131	68	338	6,301	1,124,430
1998	575	520	250	141	246	1,416	412	292	237	60	147	4,296	1,101,165
1999	787	681	643	693	394	695	1,737	478	237	222	232	6,799	989,816
2000	874	279	352	1,178	1,198	628	550	1,801	711	382	403	8,356	1,132,707
2001	1,441	832	438	403	1,023	1,081	469	237	709	513	505	7,651	1,387,194
2002	615	283	585	842	864	1,140	596	295	410	772	834	7,236	1,480,195
2003	350	104	659	1,116	1,324	1,205	1,604	890	402	521	1,837	10,012	1,490,070
2004	297	189	121	979	975	748	440	477	236	148	581	5,191	1,480,876
2005	301	91	164	759	2,230	1,526	812	375	288	223	532	7,301	1,483,271
2006	741	30	31	206	699	941	621	302	174	150	355	4,250	1,467,229
Average 1996-2006	859	326	311	601	980	1,017	798	565	329	286	559	6,632	1,302,703

- Without much surprise we can see that the years with higher harvests generally had an above average volume of pollock in the 3-5 year age range.
- Among the 1995-2000 year classes, all but one year had an above average volume of fish, leading to a string of healthy harvests from 2001 to the present.
- Each of the 2001-2004 year classes were well below the average 1995-2006 volume.
- The 2005 year class was more voluminous again, but still under the average.
- This suggests that the pollock biomass will be at a cyclical low from 2007-2010 before starting to climb again.

7.2. Climate change

- More alarming than the cyclical contraction of the pollock stock is the apparent effect of climate change on the fishery.

- Scientists have noted several effects of climate change on the traditional pollock fishing grounds, including:
    - Higher water temperatures
    - Lower abundance of zooplankton (a pollock's main food)
    - In 2006, a boom in squid population in a major pollock fishing ground near Dutch Harbour
- The first two developments have begun to push the pollock northward in search of cooler water and food.
- The last development had the same effect in 2006, raising the fishery's squid bycatch and forcing the fleet to close this nearby fishing ground for several weeks in favor of grounds further afield.
- Targeting grounds further afield from Dutch Harbour in 2006 was a minor adjustment to the at-sea factory ships, but was a major cost increase for shore-based vessels, which had to steam an extra few hundred kilometers at the beginning and end of every trip, as well as shorten their fishing days to avoid fish spoiling in their hold.
- In addition there were reports of the pollock travelling further into Russian waters during the summer.
- In recent years the pollock have spent the majority of the year in US waters, crossing into Russian waters only briefly before returning south.
- This has put the burden on Russian ships to steam long distances to access the fish.
- But in 2006 the pollock spent longer in Russian waters, closer to the Russian coast, shifting travel costs to US vessels.
- As oceanographers and fisheries scientists publish more studies on the effects of climate change on pollock stocks, we may be able to incorporate this data into our projections.
- Without the data I have not factored climate change into my projections, but will simply state that this is an important question requiring study.

7.3. Conclusions

- NPFMC estimates that the stock will contract significantly for 2008 and 2009.
- Even with the 27% cut to TACs in 2008, the Council still estimates that the catch for 2008 and 2009 will be 100% of ABC, or put another way: the catch will be the maximum possible at estimated stock levels.
- Since the NPFMC will be releasing 100% of the ABC as TAC in 2008 and 2009, I assume that this will continue in 2010-2011.

- Therefore, since the year class numbers indicate that stocks will fall an additional 15% by 2010, I estimate that TACs in the BSAI will fall by the same amount, or an additional 7.5% per year in 2010 and 2011.

HARVEST PROJECTIONS FOR ALASKAN POLLOCK FISHERIES, 2008-2011 *all figures in metric tonnes (MT) unless otherwise noted*				
Area	**2008**	**2009**	**2010**	**2011**
BSAI	1,008,810	1,008,810	933,149	863,163
GOA	54,162	70,353	66,000	57,000
Total	1,062,972	1,079,163	999,149	920,163

- Using 2009 projections as a base, I expect that annual pollock harvests will fall to in 1.00 million MT in 2010 and 920,000MT in 2011.
- These numbers are well below harvests in recent years and would be among the lowest pollock harvests in the past 30 years.

8. APPENDIX

8.1. Acronyms

- ABC Allowable Biological Catch
- BSAI Bering Sea / Aleutian Islands
- DAH Domestic Annual Harvest
- DOC US Department of Commerce
- EBS Eastern Bering Sea
- EEZ Exclusive Economic Zone
- GOA Gulf of Alaska
- MT metric tonnes
- NMFS National Marine Fisheries Service (NOAA Fisheries)
- NOAA National Oceanic and Atmospheric Administration
- NPFMC North Pacific Fisheries Management Council
- OFL Over Fishing Level
- OY Optimum Yield
- TAC Total Allowable Catch (a.k.a. quota)

[1] http://fishbase.org/Summary/SpeciesSummary.php?id=318
[2]http://fishbase.org/Reproduction/MaturityList.cfm?ID=318&GenusName=Theragra&SpeciesName=chalcogramma&fc=183
[3] http://fishbase.org/report/FAO/FAOCatchList.cfm?scientific=Theragra+chalcogramma
[4] http://seattletimes.nwsource.com/cgi-bin/PrintStory.pl?document_id=2004173286&slug=salmon09m&date=20080209
[5] http://www.fakr.noaa.gov/npfmc/current_issues/bycatch/SalmonBycatchMotion208.pdf
[6] http://www.dfo-mpo.gc.ca/fgc-cgp/documents/meltzer/DONUTHOLEfinal.pdf, http://www.dfo-mpo.gc.ca/fgc-cgp/documents/meltzer/maps/DonutHole.pdf
[7] 1981-2006: http://www.afsc.noaa.gov/refm/docs/2007/EBSpollock.pdf, http://www.afsc.noaa.gov/refm/docs/2007/GOApollock.pdf
[8] http://www.fakr.noaa.gov/npfmc/CouncilSpecs1207.pdf