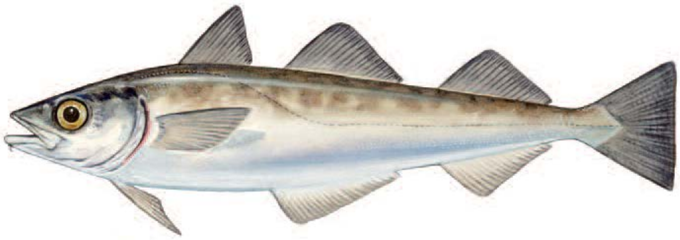
Responsible Sourcing Guide: Alaska pollock

Version 6 – September 2013



Theragra chalcogramma IMAGE © Scandinavian Fishing Year Book

Annual catches in the fishery for Alaska pollock average around 3 million tonnes (t) (1). Production is split fairly evenly between fillets, whole (headed and gutted) and surimi, which is sold in the UK as crab sticks. The roe from pre-spawning pollock is also commercially important. Frozen Alaska pollock fillets are used throughout Europe and North America, as the raw material for high quality breaded and battered fish products. Consumption in the UK in 2011 was around 18,000 t.

Alaska (Pacific) pollock, *Theragra chalcogramma*, is a semi-pelagic schooling member of the cod family, that is widely distributed in north temperate and arctic waters of the North Pacific Ocean (2). Its range extends from the southern Sea of Japan in the west to California in the east, and it is particularly abundant in the Gulf of Alaska, Bering Sea and Sea of Okhotsk, with an aggregate biomass estimated at some 18 million t in 2010-12. It is exploited by a variety of countries, including Canada, Japan, Korea, Russia and the United States of America.

Pollock stocks have been depleted since the mid-1980s, but now appear to be either stable or increasing in US shelf waters, and in good condition in the Russian waters of the western Bering Sea, the Sea of Okhotsk, and in Japanese waters. There is a moratorium on commercial pollock fishing in the central Bering Sea, where stocks remain in poor condition.

The purpose of this guide is to outline the status of Alaska pollock stocks, describe some of the protection measures and discuss environmental and ecological interactions.

BUYERS' TOP TIPS

Know your source of supply and stock status

Alaska pollock is caught throughout the sub-arctic North Pacific. As the sustainability of your supply will depend on the stock from which the product has been caught, it is essential to know the geographic source of your supply. The table in this guide describes sustainability indicators region-by-region.

An informed buying policy

The determination of governments to manage the fisheries, and the willingness of industry to participate in the management are indicators of future sustainability. Throughout its range, Alaska pollock is subject to national and international fisheries management measures, which are described in this guide.

Seafish Responsible Sourcing Service

This is one of a series of Responsible Sourcing Guides which can be found on the Seafish website.

This links to other sources of information and the Responsible Fishing Scheme (BSi: PAS 72: 2006), aimed at ensuring best quality and environmental practice onboard vessels.

For further guides and information see:
http://tinyurl.com/seafishrsg

Status of Alaska pollock stocks

Biology

Juvenile Alaska pollock generally live inshore near the sea bed, spending more time in mid water, and moving to depths below 70m as they approach maturity at three to four years (30–38cm) (3). A large adult female has the potential to produce more than two million eggs over the course of a spawning season. Adults perform daily vertical migrations as they feed on a variety of zooplankton, particularly euphausiids (krill) and copepods, and small pelagic fish such as myctophids, herring and capelin. Alaska pollock is considered a keystone species within the ecosystem, as it is a major consumer of zooplankton and prey to numerous species including Steller sea lions off the USA.

Assessments

Alaska pollock stocks are assessed in a number of discrete areas within the species' range. The USA assesses stocks in the Gulf of Alaska, on the Eastern Bering Sea shelf (less than 1000m depth), the Central Bering Sea - Bogoslof Islands, and the Aleutian shelf region (all to the east of the U.S.-Russia Convention line) (see Fig. 1). Stock abundance in the international waters of the central Bering Sea is reviewed under the Convention on the Conservation and Management of Pollock Resources (CCMPR). Russian scientists assess the stock within the Western Bering Sea, Sea of Okhotsk and Kamchatka region, whilst Japanese scientists are responsible for pollock stocks in Japanese waters. These assessment areas are based on a consideration of spawning locations, larvae drift patterns, genetic studies and biological parameters (4). The populations of pollock in these management areas probably intermingle to some extent, but the scale of exchange is unknown and there is uncertainty about how the environment effects the distribution of particular stocks.

Pollock stock assessments use population models, incorporating information on commercial catch and fishing effort, and length and age data, gathered by sampling catches at sea and on markets. They may also use abundance indicators from research vessel trawl and acoustic surveys to generate estimates of stock size.

<u>In the USA</u>

In the USA, biomass stock reference points relate to maximum sustainable yield (B_{MSY}) or a proportion (usually 30, 35 or 40%) of the un-fished biomass with average long-term recruitment. There are no fishing mortality reference points as such (or safe biological limits), instead advice on sustainable exploitation is given as a fishing mortality rate. These rates are calculated to move stock status towards $B_{MSY.}$ In turn they are used to determine an acceptable harvest (or range of harvests) for a given stock, this is called the Allowable Biological Catch (ABC). The ABC is determined by the status and dynamics of the stock, the quality of available information, environmental conditions and other ecological factors, and prevailing technological characteristics of the fishery. The Total Allowable Catch (TAC) is decided by fishery managers, taking into account multi-species interactions and other management considerations (e.g. Stellar sea lion status, see page 8).

In Russia and Japan

Russian and Japanese TACs are based on the estimated biomass abundance balanced against the desire to keep the adult biomass (SSB) above a level where recruitment of young fish is not impaired (5, 6, 7) that is inside safe bilogical limits. In Russian waters, TACs are set in a two-year process, involving comprehensive stock estimation methods and a reviewing system, and there appears to be no divergence between recommended and TACs set by the Russian Federal Fisheries Agency (in many other fisheries scientific TAC recommendations are advisory and may be modified by fishery managers in line with socio-economic objectives) (5, 6).

MSC certification

The US fishery for pollock in the Bering Sea, Aleutian Islands and Gulf of Alaska, which is shore-based and predominantly uses mid-water trawls, is certified as sustainable by the MSC, whilst three Russian mid-water trawl fisheries for pollock (West Bering Sea, Navarinski, and Sea of Okhotsk) are currently undergoing assessment (8).

The current status of these pollock stocks and their catching opportunities are shown in the table on page 4.

Organisation key

NPFMC: The North Pacific Marine Fisheries Commission has jurisdiction over the Exclusive Economic Zone (EEZ) off Alaska, and has primary responsibility for groundfish management in the Gulf of Alaska (GOA) and Bering Sea and Aleutian Islands (BSAI).

AFSC, NMFS: The Alaskan Fisheries Science Center of the USA National Marine Fisheries Service, responsible for carrying out research in the coastal oceans off Alaska and parts of the west coast of the United States, as a basis for management and conservation of living marine resources.

CCMPR: The Convention on the Conservation and Management of Pollock Resources in the Central Bering Sea, covering the high seas area of the Bering Sea beyond the US and Russian 200-mile jurisdictions.

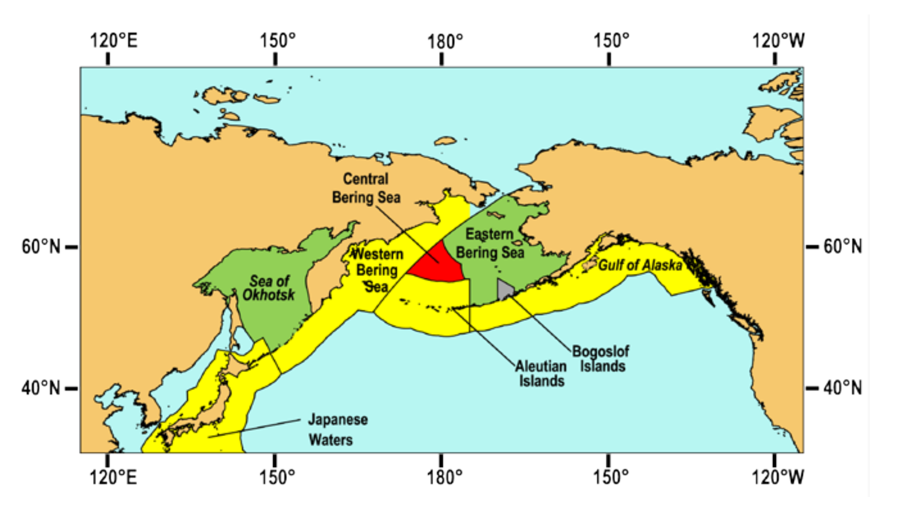
TNIRO: The Russian Pacific Research Institute for Fishery and Oceanography is responsible for the research and assessment of Russian Pacific resources.

MSC: The Marine Stewardship Council is an independent non-profit organisation that promotes responsible fishing practices.

Management Stock (colour coded to Fig. 1)	Agreed TAC (t) (8b)	Allowable Biological Catch (ABC) (t) (8b)	Scientific assessment and advice
U.S. stocks www.afsc.noaa.gov			
Inside safe biological limits			
Eastern Bering Sea	1,247,000	1,375,000	Survey indices were available for 2011, when the stock was composed of many immature (3-year old) fish. Though the female, SSB in 2012 is estimated to be above B_{MSY} (see p2), and is expected to continue increasing, in part due to the above-average incoming year classes. It is still recovering from relatively low Spawning Stock Biomass levels and the recommended Allowable Biological Catch is below the maximum permissible (9).
At risk of being outside safe biological limits and below biomass action point $B_{35\%}$			
Gulf of Alaska	121,046	121,046	Survey abundance indices in 2011 were similar to, or slightly lower, than in 2009/10, but were 32% above the mean for 2006-08. The estimated abundance of mature fish in 2012 is projected to be 227,723 t, 11% higher than in 2011, but is still below 35% of the un-fished spawning biomass (271,000 t), based on average post-1977 recruitment, and is expected to increase gradually over the next five years, with a corresponding increase in ABC (10).
Aleutian Islands	19,000	37,300	The most recent assessment includes catch data for 2011 and some improvements to previous years' data, and shows that the abundance of pollock in the Aleutian Islands remains below 35% of the un-fished biomass) a consequence of below-average recruitment of young fish since 1992. Since 2005, the TAC has been constrained to 19,000 t or the Advisory Biological Catch, whichever is lower, due to U.S. conservation regulations for Steller sea lions (11).
Reference points not defined.			
Bogoslof Islands	100	10,100	There has been no new survey since 2009, when the lowest biomass in the region since 1988 was observed (110,000 t, compared to the target biomass of 2 million t). Most of the decrease in abundance was for pollock less than 50 cm in length, which may indicate poor recruitment of the 2003 - 2005 year classes (12).

Management Stock (colour coded to Fig. 1)	Agreed TAC (t) (8b)	Allowable Biological Catch (ABC) (t) (8b)	Scientific assessment and advice
Russian and Japanese stocks			
Inside safe biological limits			
Sea of Okhotsk	805,000 (2014)	805,000	Estimates of the biomass levels (last determined at 6,649,000 t in 2009) suggest that the Sea of Okhotsk pollock stock is in a good condition close to its target reference point which would yield MSY, with low harvest rates. (5)
At risk of being outside safe biological limits			
West Bering Sea	31,500 (2013)	44,000 (2013)	The 2013 model runs estimate the 2012 spawning stock as close to levels which preceded the closure of the main target fishery in 2002. While the stock recovers, fishing is 'mainly limited to inshore Danish seining' (6).
Japanese stocks	171,000 (2013)	166,000 (2013)	There is no long-term target for biomass, though the fishing mortality corresponding to the current TAC is expected to maintain biomass inside safe biological limits, with a 24% risk of the stock being outside safe biological limits during the next 10 years. TACs are regularly set above advised catches. (7).
Suffering from reduced reproductive capacity and/or harvested unsustainably			
Central Bering Sea	0	0	Moratorium on fishing for pollock.

Figure 1: The main stock areas for Alaska pollock (colour keyed to status table)



Management and conservation measures

Management of pollock fisheries in US waters is based on management plans for groundfish in the Gulf of Alaska, and the Bering Sea and Aleutian Islands (9, 10, 11). These include regulations to minimise by-catch of target and non-target species, and limit impacts on the traditional fisheries of the region, such as salmon, halibut and crab.

The US has rigorously implemented management measures, including licensing requirements, limits on the number of fishermen in the fishery, catch quotas, fishing seasons, gear restrictions, area closures, by-catch reduction, reporting requirements and observer monitoring of both target and non-target species. These are used to assess the need for both long-term statutory and short-term voluntary closures for by-catch avoidance, as well as to collect scientific data on by-catch species. Russia also sets catch quotas in its EEZ. Foreign vessels are subject to on-board inspections and daily activity reporting.

Fishing gears

USA vessels primarily use mid-water (pelagic) trawls to catch Alaska pollock. USA Federal regulations prohibit bottom trawling for pollock, and there are restrictions on the use of static gears such as gill nets for pollock in some US waters. The Russian fishery uses semi-pelagic trawls (bottom trawling was discontinued in the 1990s) and targets dense aggregations of spawning and pre-spawning pollock (13). The US Alaska pollock fishery is the largest fishery in North America. The BSAI pollock fishery employs trawlers of 110 to 150 feet in length making short trips and offloading catches at shoreside plants. Some trawls deliver to floating processors. Catcher-processor vessels comprise the balance of the fleet. In the Gulf of Alaska, the pollock fishery uses predominantly pelagic trawls, and is entirely shore-based.

Sustainability issues:

- **Stock structure**

Knowledge of the biological stock structure of Alaska pollock in the North Pacific is based on a consideration of spawning locations, larvae drift patterns, genetic studies and biological parameters (3, 4), but the scale of movement of pollock between management areas is unknown, which has implications for the reliability of stock assessments.

- **Overfishing**

Overfishing has been a problem outside the USA management zone. The CCMPR signatories in the central Bering Sea assess Alaska pollock resources within these international waters. Results from trial fishing and other studies indicate that the stock there remains low, and the moratorium on fishing, which has been in place for more than 13 years, has not yet led to recovery.

There was some TAC overshoot (that is fisheries catching more than the set TAC) in the Sea of Okhotsk in the mid-1980s and mid-1990s, but catches are reported to have followed the set TAC since 1997. Russian management measures that involve restrictions on foreign fishing vessels, and formal agreements between countries, have reduced illegal and unregulated fishing, and harvest rates (proportion of the stock harvested each year) that were particularly high from 1995 until 2001 have remained at the lowest levels of the time series since 2004.

Environmental conditions

Research is being carried out on how seasonal and long-term environmental conditions affect the distribution and abundance of Alaska pollock in the Gulf of Alaska and Bering Sea (11, 14, 15, 16, 17).

- **Recruitment**

There appears to be a link between strong pollock recruitment in the Bering Sea and years with warm sea temperatures, and northward transport of pollock eggs and larvae. During 2004 and 2005, age-0 pollock were very abundant and widely distributed to the north and east on the Bering Sea shelf, where sea temperatures were very warm and the water column was highly stratified during summer. However, the recruitment success of these cohorts to the fishery was low, possibly because of higher over-winter mortality. In contrast, the overwinter survival of age-0 pollock was thought to be higher during 2006 - 2010, when there were cool sea temperatures and less water column stratification.

There is further evidence for this link between year-class strength of pollock and temperature in the Sea of Okhotsk (18), where a cold period after 1998 was believed to have reduced productivity of pollock during the early 2000s, whilst warming since 2002, extending to the western and northwest parts of the sea, appears to have led to more favourable environment conditions for pollock reproduction, resulting in strong year-classes in 2004 and 2005 (as in the Bering Sea). The conjecture that the subsequent decrease in temperature in the Northern Pacific could have a negative impact on pollock appears to have been borne out, as recent recruitment to the fishery has been relatively poor in all but the East Bering Sea stock.

In Japanese waters to the south, a regional warming trend driven by a shift in currents is thought to be linked to a decreasing trend in pollock recruitment since the early 1980s, which steepened in the mid 1990s and was recently close to lowest recorded level (19).

- **Population biomass**

Pollock population biomass declined steeply from the mid-1980s, but has recently shown a recovery in the Gulf of Alaska, Bering Sea, Aleutian Islands and Sea of Okhotsk. It is suggested that present changes in the Bering Sea climate, and the response of its ecosystem, reflect natural variability, with warm or cold periods of several years, rather than a global warming trend (20). In addition to the effects on pollock recruitment outlined above, the normal food supply for pollock appeared to shift to less favourable species towards the end of the warm period (2003-2005), and pollock predators, such as arrowtooth flounder (see Ecosystem interactions) became well established. Though the favoured food supply for pollock returned to the Bering Sea, with the recent shift to a cold period, it was less available due to the presence of sea ice. A swing back to average temperatures in the Bering Sea due to El Niño conditions is anticipated, followed by a prolonged period of warm temperatures by 2020 or before. Such a scenario would favour sub-Arctic species such as salmon and pollock.

- **Ecosystem interactions**

The most important predators of Alaska pollock are arrowtooth flounder (the largest single source of mortality for juvenile and adult pollock), Pacific halibut, Pacific cod, Atka mackerel and Steller sea lion (in addition to the directed pollock fishery). Of these predators, Pacific halibut is most dependent on pollock (48% of its diet), followed by Steller sea lion (39%), arrowtooth flounder (24%) and Pacific cod (18%).

Populations of most of these predators in the Bering Sea and Gulf of Alaska are stable or increasing, in some cases notably so since the 1980s. In the case of arrowtooth flounder, there is some concern that increased predation and competition for food may have a negative impact on Alaska pollock stocks.

- **Stellar sea lions**

Though populations of Steller sea lions (*Eumetopias jubatus*) have grown since the 1960s in northern Sea of Okhotsk and Sakhalin Island areas, and more recently to the east of 178°W, Steller sea lions have declined sharply in the western waters of Alaska, western Bering Sea, Commander Islands, and Eastern Kamchatka (6, 9). Concern for the conservation status of Steller sea lions in the USA has led to management measures designed to increase prey availability in some areas. Since 1992, the Gulf of Alaska pollock TAC has been apportioned spatially and temporally to reduce potential impacts on Steller sea lions. In 1999, the NPFMC closed the Aleutian Islands region to directed pollock fishing. The fishery was reopened in 2005, but restricted to two small areas well away from Steller sea lion rookeries and haul-out sites along the Alaska Peninsula, the Aleutian Islands and the northwestern coast of the Gulf of Alaska.

By contrast, the Japanese government recognises that Steller sea lions may cause economic damage to the pollock fishery, and allows them to be killed under a limit set by the Japanese Fisheries Agency, with fishermen paid compensation as appropriate.

Product charactersitics and seasonal cycles

Alaska pollock flesh and its roe are important commodities. The fillets are used fresh for fish and chips and fish sandwiches, whilst frozen flesh is used to produce fish shapes and fish-finger type products. The flesh is used to produce surimi for Far East markets and the familiar 'crab sticks'. Alaska pollock roe is mainly used for the production of salt-seasoned and fermented seafood (myungran-jeot).

Alaska pollock is caught throughout the sub-arctic North Pacific and the length of the spawning season varies by area from two to seven months.

	J	F	M	A	M	J	J	A	S	O	N	D
Bering Sea												
Aleutian Basin												
Gulf of Alaska												
Kamachatka												
Sea of Okhotsk												
				Spawning						Peak spawning		

Supply chain standards

Responsible practice in the chilled and frozen supply chain depends on correct catching, gutting, washing, chilling or freezing, processing and handling practices throughout the chain. There are standards which cover these aspects from capture to retailer:

• **Seafish Responsible Fishing Scheme.** Sets best practice standards for fishing vessels, based on British Standards Institution specifications (BSi: PAS 72:2006);

• **British Retail Consortium (BRC) Global Standard & Safe & Local Supplier Approval (SALSA) certification.** Designed to raise standards in the seafood processing and wholesaling sectors.

Responsible Sourcing Services

This guide is one of a series of Seafish Responsible Sourcing Guides.
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