# Market and consumption of walleye pollock, and approach to fishery management in Korea

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# Distribution and major fishing grounds for walleye pollock



(from Marine Fisheries Review)

#### Global capture production of walleye pollock



Year

- World Highest Catch (1986): 6.75 million tons (eg) Russia's catch 3.6 million tons
- Landings varied considerably in all commercial fishing grounds
- Fishing in the Donut hole was banned by an international moratorium in 1993

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# Pollock fisheries (1)

- The name, Myung-Tae (明太)
  - might be called in a different name in history books or folktales. The name (Myung-Tae) was shown in history book in 1652.
  - was originated from a folktale, "fished by Mr. Tae(太) in Myung(明)-Cheon Province".
  - has many (about 20) different names and dialects currently.

#### • Pollock fishery in Korea

- might be begun at about 600 years ago in the late Koryo Dynasty.
- has been an important (sea)food source since the early 19<sup>th</sup> century.
- was the major fisheries in 20<sup>th</sup> century, but almost collapsed in the late 20<sup>th</sup> century.

(Source: Park, Koo-Byung (1978), Thesis Collection of the National Fisheries University at Busan 20: 25-51.)

## Walleye pollock production of Korea



- Increased during the 1970s and the early 1980s
- Highest catch (1981): 161,837 tons
- No meaningful production since 2008

- Started in 1971 (around 60,000 tons)
- Highest catch (1986): 540,000 tons
- 40,000~49,000 tons since 2009

#### Catch of walleye pollock (1926~)



- Peak of pollock production appeared in the late 1930s
- The catch of walleye pollock has shown a tremendous decline in the Korean EEZ of the East Sea since the late 1980s
- In particular, since 2000 the pollock stocks were completely collapsed

Pollock records in various history books (Park, 1978)



Match/mismatch of catch record of pollock with cooling/warming period indicates that cool temperature seems to provide a favorable condition for pollock stocks in Korean waters.

# Pollock fisheries (2)



Spawning areas of walleye pollock *Theragra chalcogramma* in the East Sea.
Four major spawning stocks located in
(1) Wonsan Bay,
(2) Peter the Great Bay,

- (3) Tartar Strait, and
- (4) off the western Hokkaido, and
  - several local stocks along the rim of the coast are indicated by dots.

#### The annual catch of walleye pollock in the East Sea by country for 1980-2010



# Pollock fisheries (2) – Distribution



 Pollock was shown in the Yellow Sea in 1858 (source: Cho(趙), Jae( 在)-Sam(三)'s 松南雜識 3).

No pollock in the Yellow Sea currently, but notice that there is (isolated?) Pacific cod stock!

- The Wonsan Bay in North Korea is the biggest spawning ground in Korean waters, and the areas off the South Korea are the southern boundary of pollock distribution in the North Pacific.
   main limitation for pollock research
- Fishing for juveniles were common in South Korea in the late 20<sup>th</sup> century.

## Pollock fisheries (3)

- Any possible explanations on the collapse of pollock population?
  - severe fishing pressure on juveniles?
  - seawater warming?
  - changes in foodweb structure of ecosystem?



#### Warming of the East Sea



Warming trend in sea surface temperature was evident during the last four decades Cooling trend in temperature at 100 m depth was evident



However, there is no explanation on the relationship between seawater temperature and recruitment success of pollock.

### Changes in ecosystem structure

• Phase transitions in marine ecosystem were frequently found in natural system. Due to climate regime shift, ecosystem function will be changed by the modification of ecosystem structure and productivity



changing environment.



- Changes in species composition of two major fishes from the eastern coastal fisheries of Ko rea
- Understanding the mechanism of this cyclic pattern in fish community would be linked to trophodynamics in foodweb, and the collapse and re-visiting of pollock population in Korean waters would be understood in the light of ecosystem changes



# Pollock as a food (1)

Various cooking methods:

fresh (soup), dried, half-dried (steamed, broil), roe (salted), etc. - traditionally important fish

Sometimes, it was used as a kind of medicine.



# Pollock as a food (2)

• <u>Supply and Demand :</u>



- Supplying of pollock to Korean market is very important in the aspects of food security.
- Comparing market supply and demand for pollock between 2008–2010 shows that the supply is not meeting the demand.

# Socio-economic aspects

• Total supply and demand in Korea

Year	Distant-water Production	Domestic Production	Import	Total
1990	322,176	9798	198,006	529,980
1991	177,392	10104	267,758	455,254
1992	320,858	9504	136,980	467,342
1993	217,119	9043	111,548	337,710
1994	303,969	7605	112,469	424,043
1995	336,810	6903	131,121	474,834
1996	221,219	4445	207,753	433,417
1997	215,814	6373	187,465	409,652
1998	230,143	6232	126,093	362,468
1999	145,720	1392	208,825	355,937
2000	86,066	766	188,604	275,436
2001	199,123	207	239,401	438,731
2002	24,825	215	317,796	342,836
2003	21,890	242	413,917	436,049
2004	20,009	64	390,532	410,605
2005	26,004	25	341,236	367,265
2006	26,269	60	320,791	347,120
2007	20,109	35	403,508	432,652
2008	27,980	-	306,421	334,401
2009	38,996	1	281,272	320,269
2010	46,794	1	363,460	410,255

- Distant-water and domestic productions have significantly decreased, and the import has been much increased since 1990s.
- The estimation of annual demand for pollock is about 430 thousand ton based on yields and import in the past. However, the current supply is not meeting the demand, so that market prices were highly variable depending on the status of import.

#### Total supply and demand



- The import of pollock has shown an increase since the mid 1990s due to the decrease in catch of the distant water fisheries.
- The amount of import depends upon the stock status, agreements between countries, trade negotiations, etc.
- From past records of pollock consumption, Korea's potential pollock consumption can be estimated to be around 500,000 tons.



◆ The import of pollock by country in 2010:

Russia (80%), Japan (13%), USA (6%), China (1%)

#### Real prices of walleye pollock and other marine fishes



#### Public announcement for "Awards for live pollock"

2009



2013



### **Conclusion**

- Pollock is traditionally one of the favorable fish species for Korean. Still, the demand for pollock is strong, and the supply is not meeting the demand.
  - Domestic and distant-water productions have significantly decreased.
  - The supply depends mainly upon the import from Russia and Japan.
- Due to the decrease in pollock catch, the import has increased since 1990s, and the effective policies are needed for a stable supply of pollock.
  - The plan for pollock stock rebuilding started this year (budget: 130K \$)
  - Monitoring and investigation on market issues (i.e., supply, demand, price, etc.) are necessary.
  - The mechanism on efficient negotiation of pollock import should be established with various nations.

#### <u>Suggestion</u>

- To respond to the potential market demand for pollock in the Korean market, research studies need to clearly understand the reason for the decrease in pollock resources, and an effective stock rebuilding plan mus be set up to restore Korea's own fishery resources
- International cooperation must also be strengthened to restore pollock resources in the Bering Sea
- It would also be necessary to find alternative fish species that could substitute pollock and develop new pollock-type recipes to suit the Korean palate using these alternative fishes

