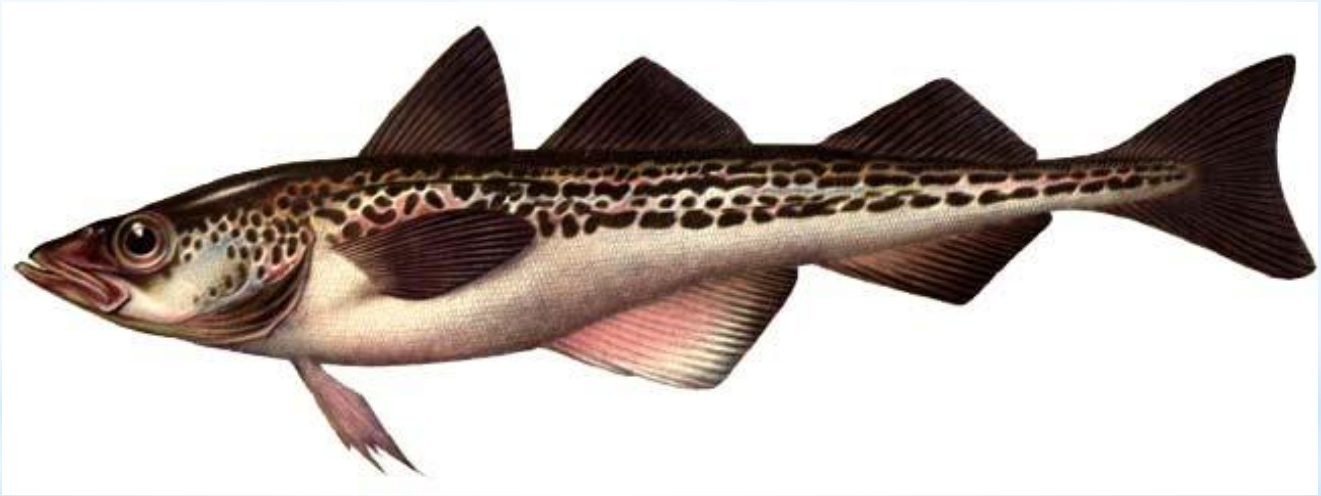
Pollock fishery and stock assessment



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XXIII ANNUAL MEETING PICES

22 th OCTOBER 2014, Yeosu, Korea

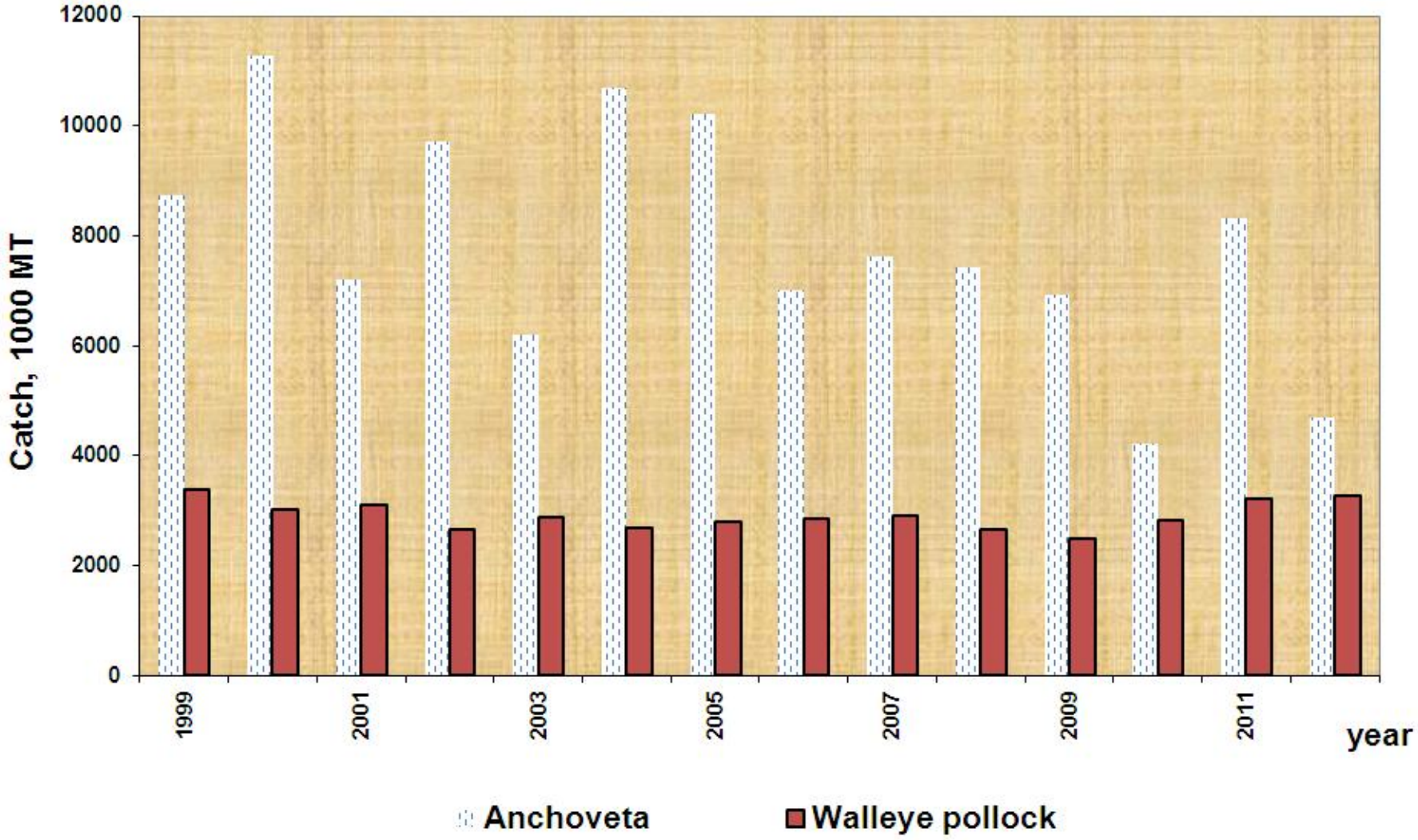
The world top 15 targets, 2008-2012, 1000 MT

Target	2008	2009	2010	2011	2012	Average	%%
Anchovetta (us)	7419	6910	4205	8320	4693	6309	25.0
Walleye pollock (i)	2649	2502	2828	3207	3271	2891	11.5
Skipjack tuna (s)	2525	2670	2634	2645	2795	2654	10.5
Atlantic herring (d)	2479	2516	2204	1780	1850	2654	8.6
Chub mackerel (d)	1930	1641	1635	1715	1581	1700	6.7
Largehead hairtail (s)	1360	1346	1341	1258	1236	1308	5.2
Yellowfin tuna (s)	1190	1157	1234	1239	1352	1234	4.9
Japanese anchovy (s)	1270	1073	1204	1325	1296	1234	4.9
European sardine (s)	1065	1245	1246	1037	1019	1122	4.4
Atlantic cod (i)	770	869	952	1051	1114	952	3.8
Jumbo flying squid (s)	895	643	816	906	951	842	3.3
Araucanian herring (s)	795	855	750	887	848	827	3.3
Atlantic mackerel (i)	611	707	887	945	910	812	3.2
Capelin (i)	254	365	507	853	1006	597	2.4
Akiami paste shrimp(s)	558	602	573	550	589	574	2.3
Total	25770	25101	23016	27718	24511	25222	100

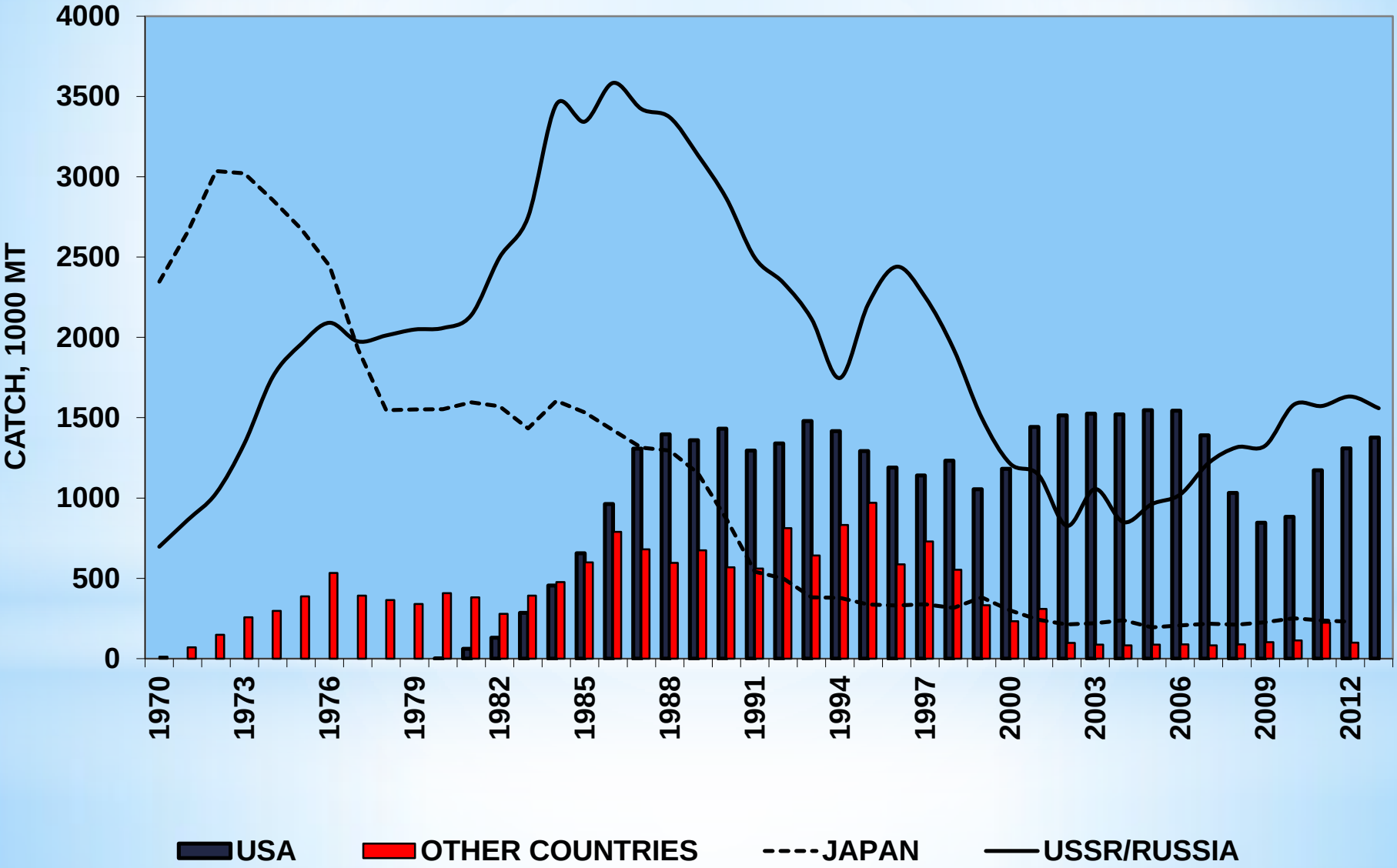
us - unstable, i - increasing, s - stable, d - decreasing

Source: FAO,2014

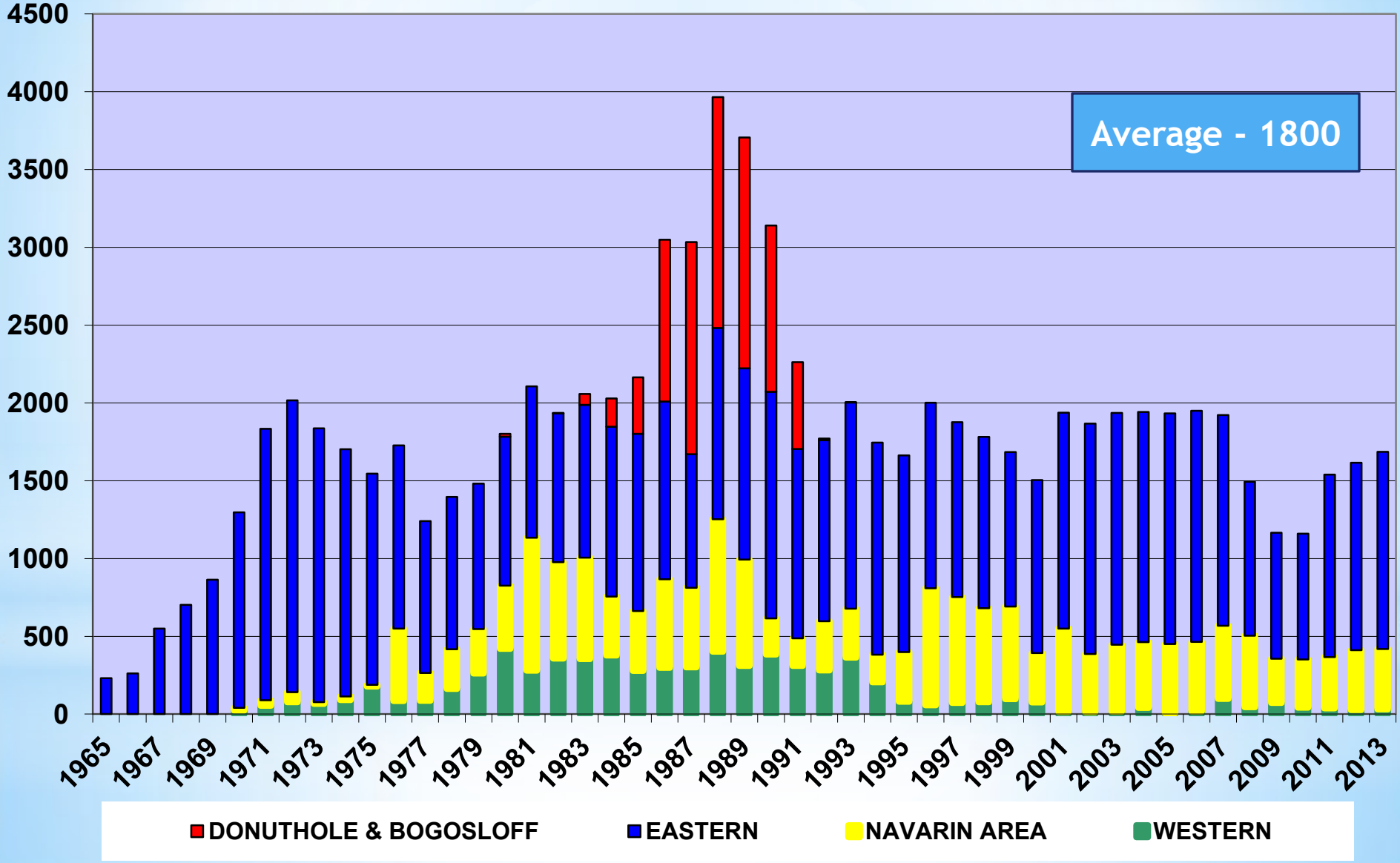
The catch of world top 2 targets, 1999 - 2012, 1000 MT (*data from FAO*)



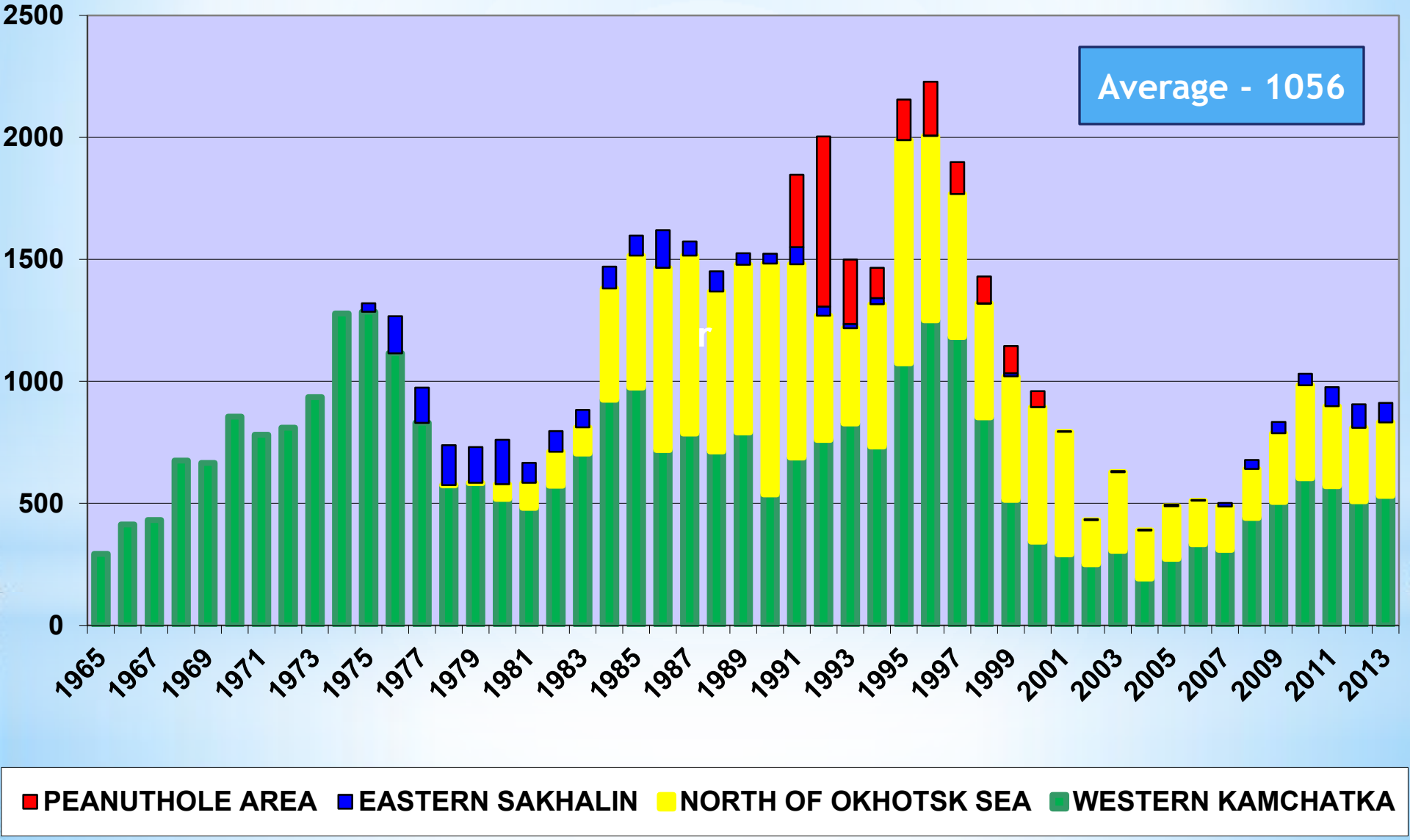
The annual catch of walleye pollock by country in 1970-2013, 1000 MT



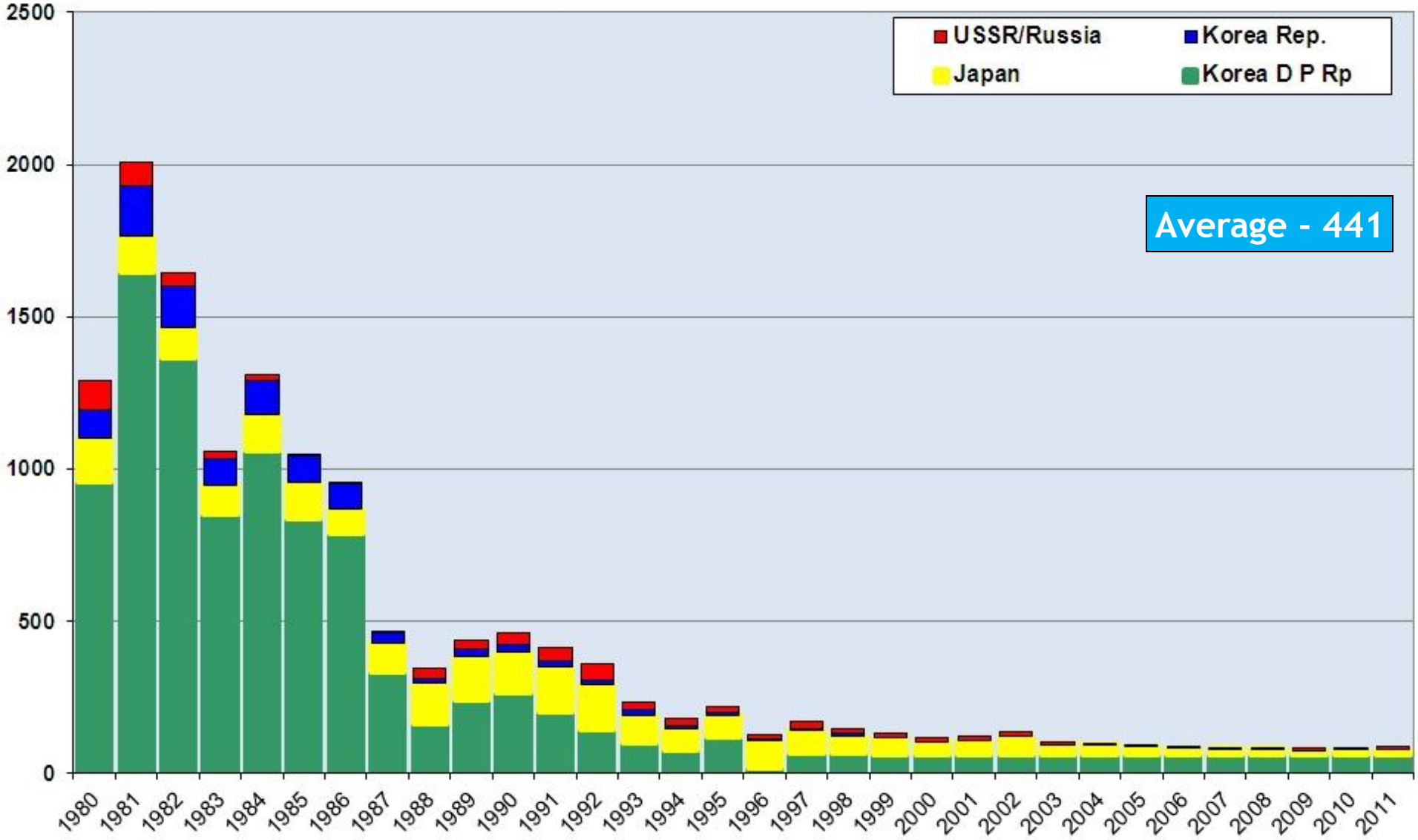
The annual catch of walleye pollock by region in the Bering Sea, 1965-2013, 1000 MT



The annual catch of walleye pollock by region in the Sea of Okhotsk, 1965-2013, 1000 MT

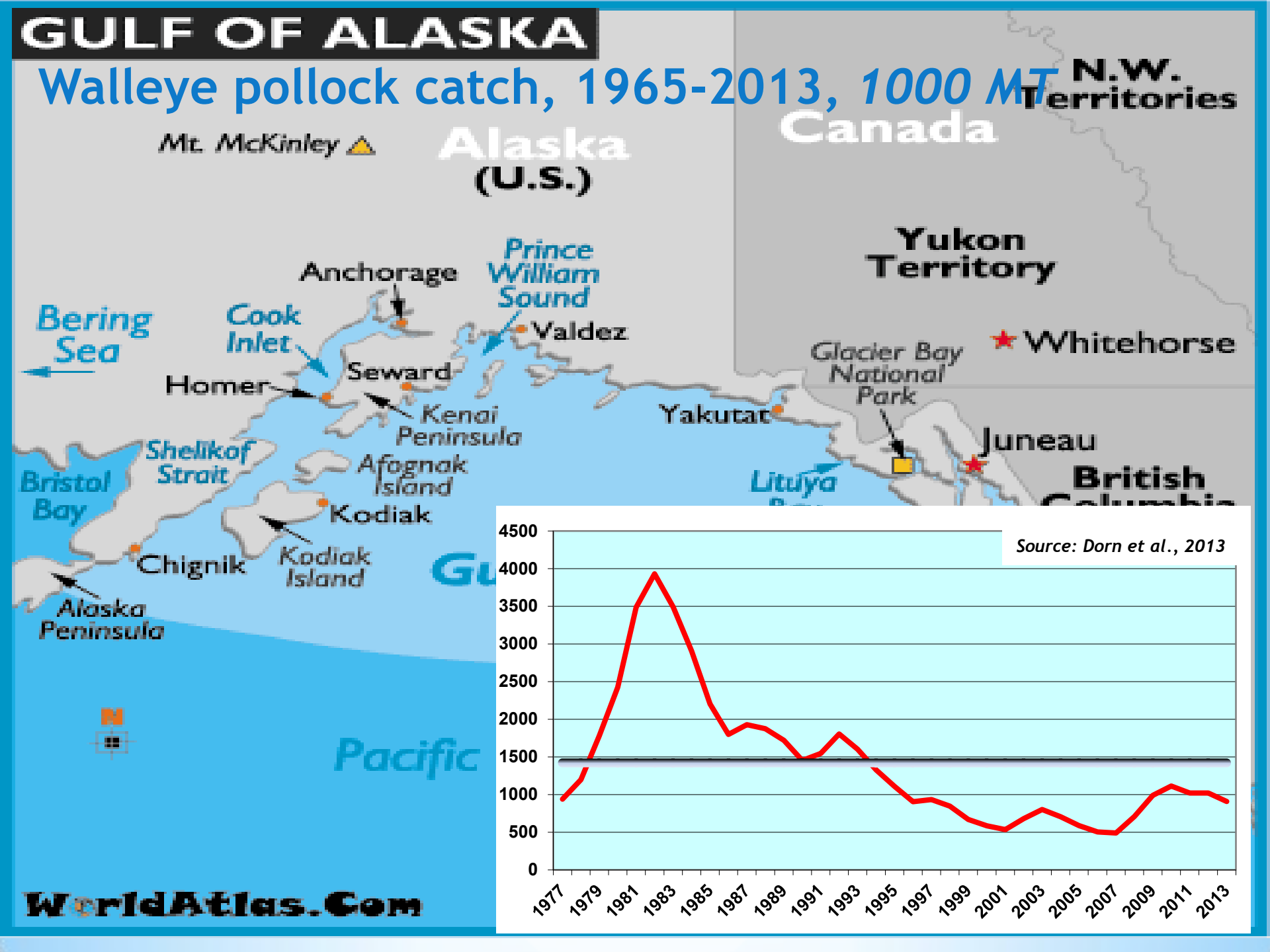


The annual catch of walleye pollock in the Sea of Japan (East Sea), 1980-2011, 1000 MT



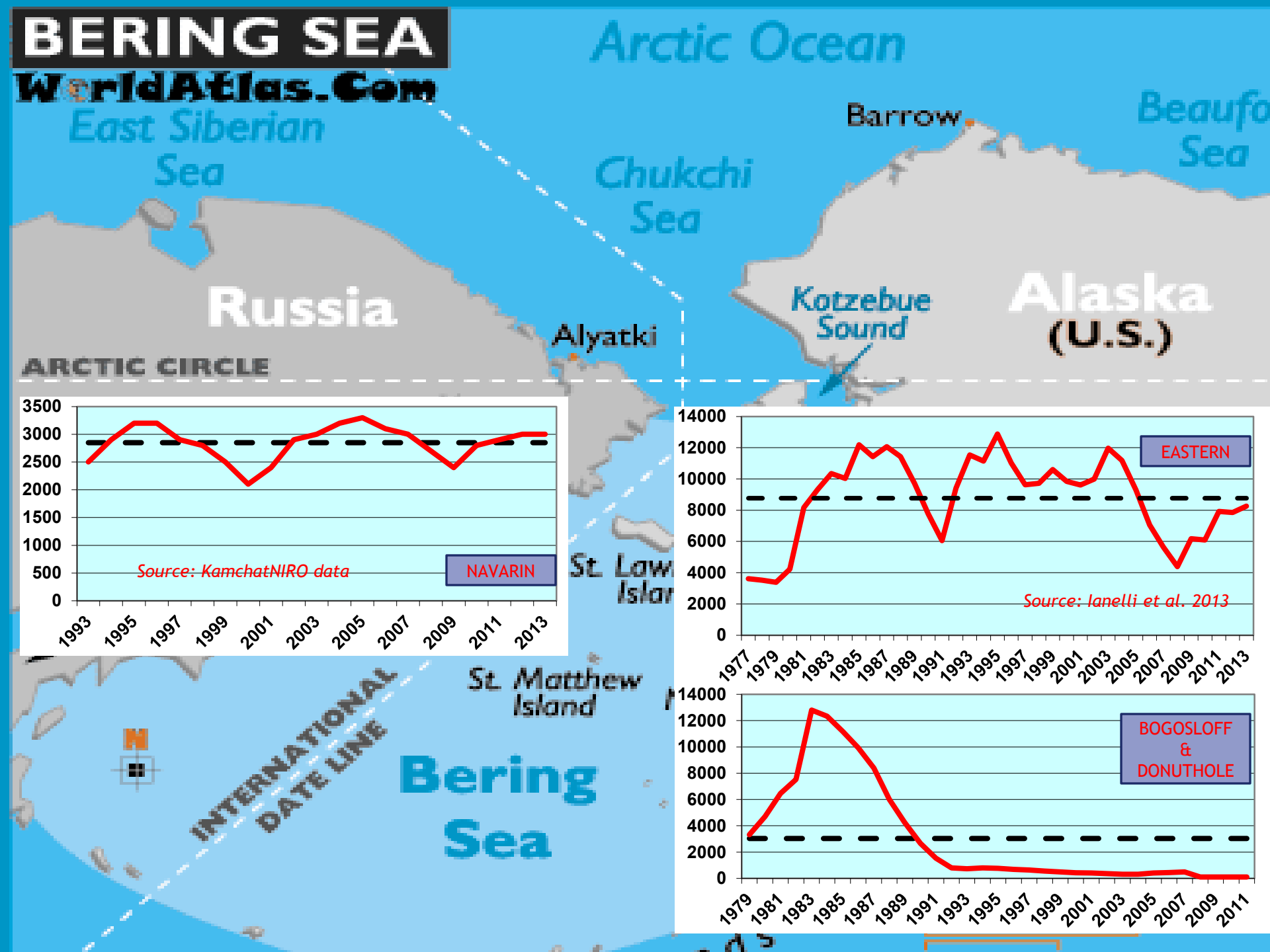
Source: Fadeev, Wespestad, 2001; FAO,2013, Makino, pers. comm.

Walleye pollock catch, 1965-2013, *1000 MT*



BERING SEA

WorldAtlas.Com



RUSSIA

Bering Sea

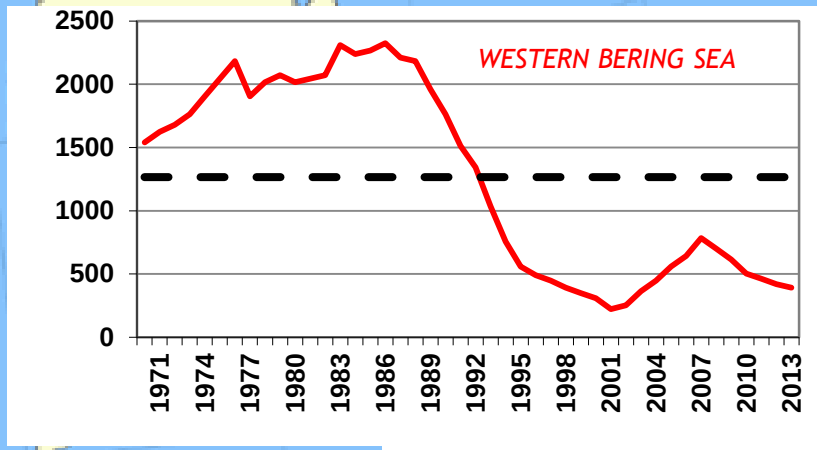
Sea of Okhotsk

Pacific Ocean

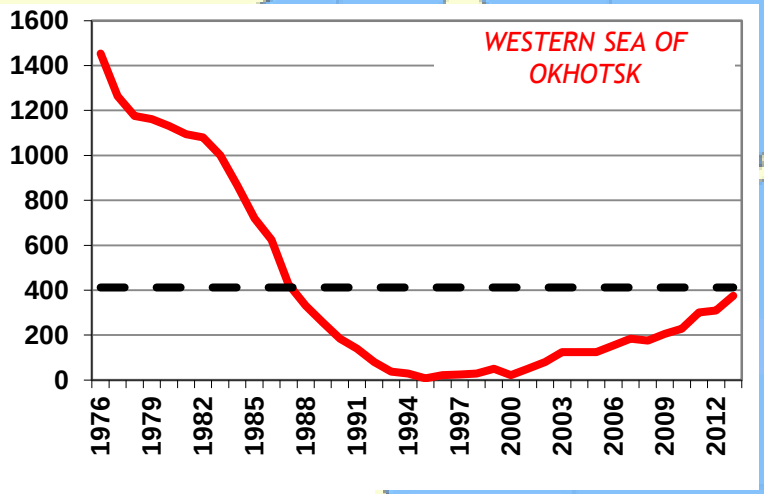
Sakhalin

Kuril Islands

Japan

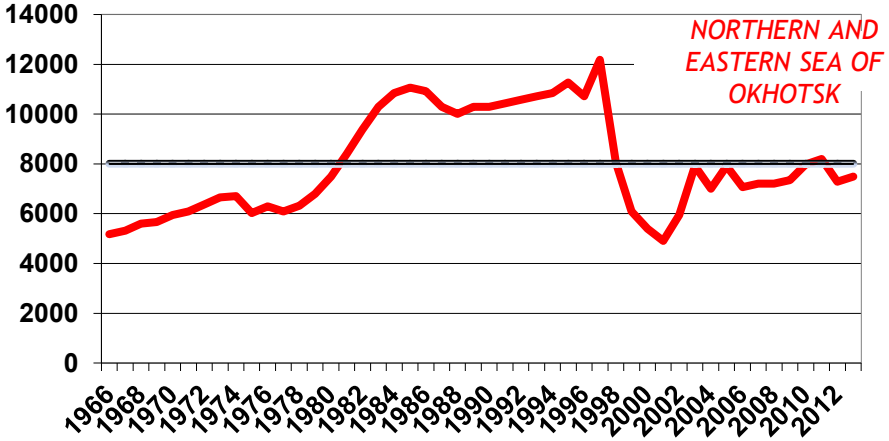


Source: KamchatNIRO data



Source: Mikheev, 2014

Source: KamchatNIRO data



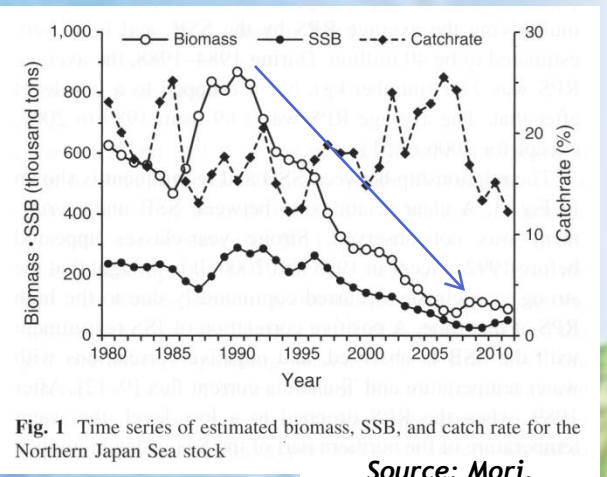


Fig. 1 Time series of estimated biomass, SSB, and catch rate for the Northern Japan Sea stock

Source: Mori, Hiyama, 2014

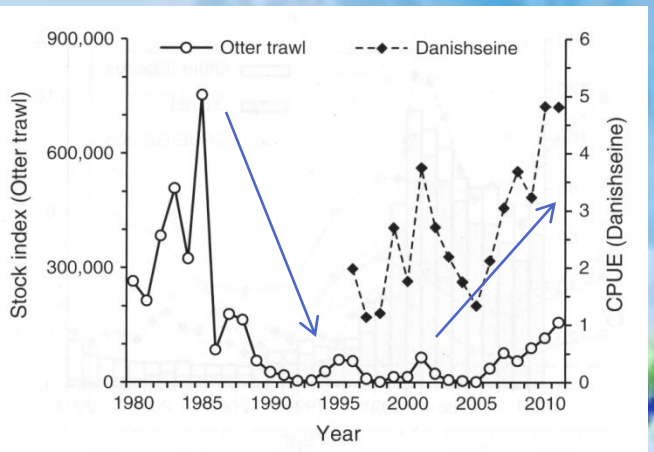


Fig. 7 Time series of the stock index (otter trawl fishery) and the CPUE (Danish seine fishery) of the Southern Okhotsk Sea stock

Source: Mori, Hiyama, 2014

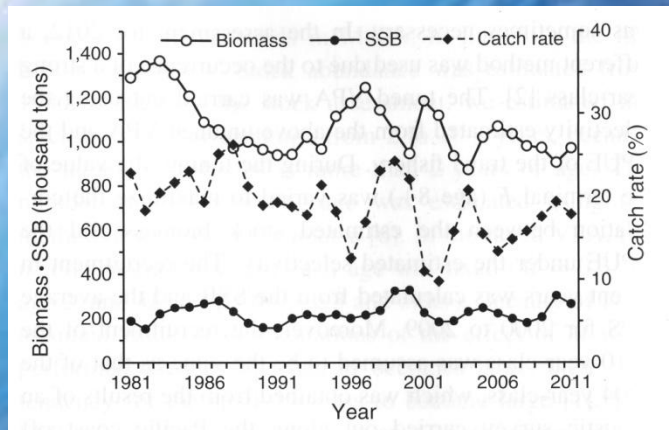
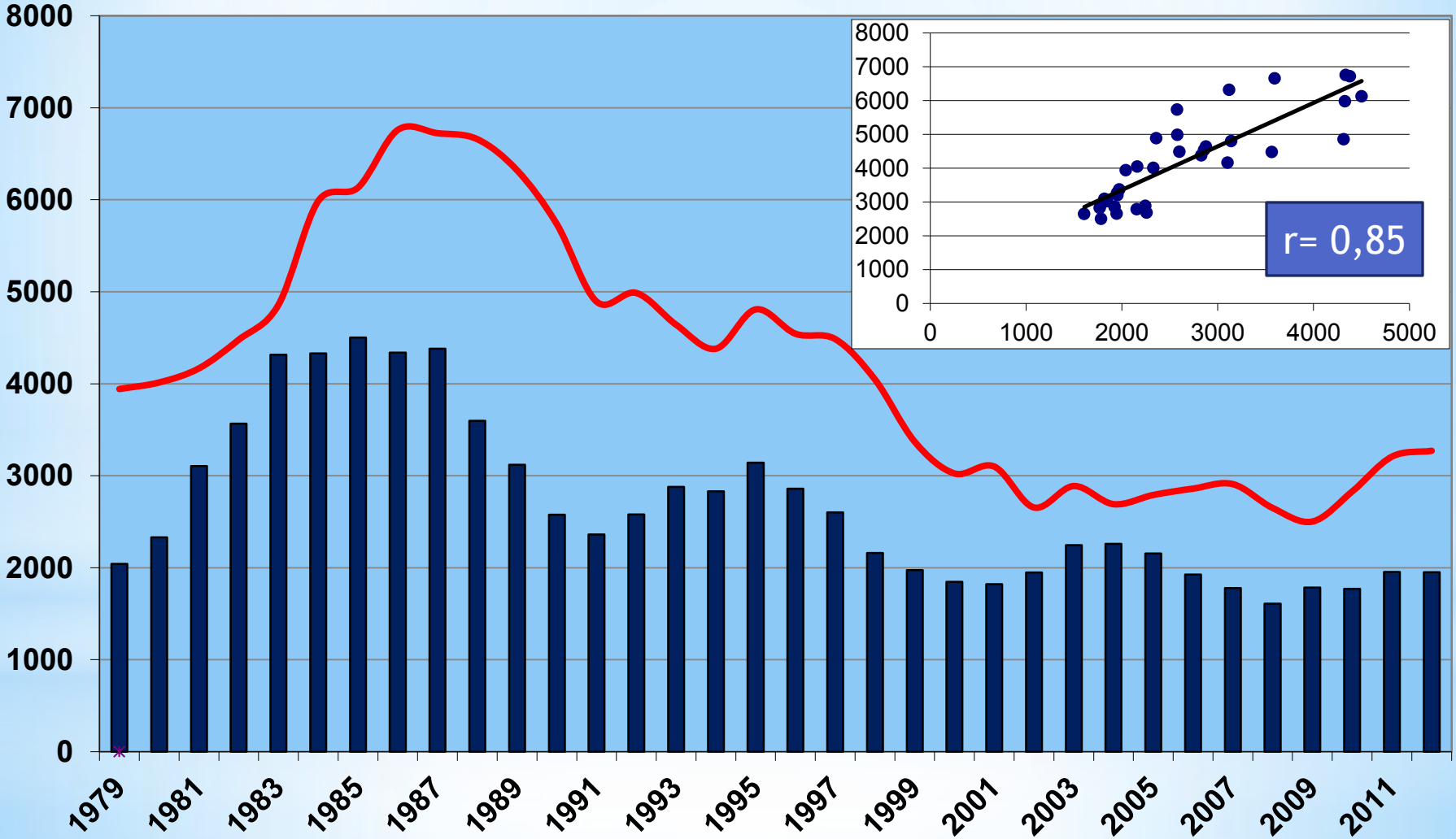


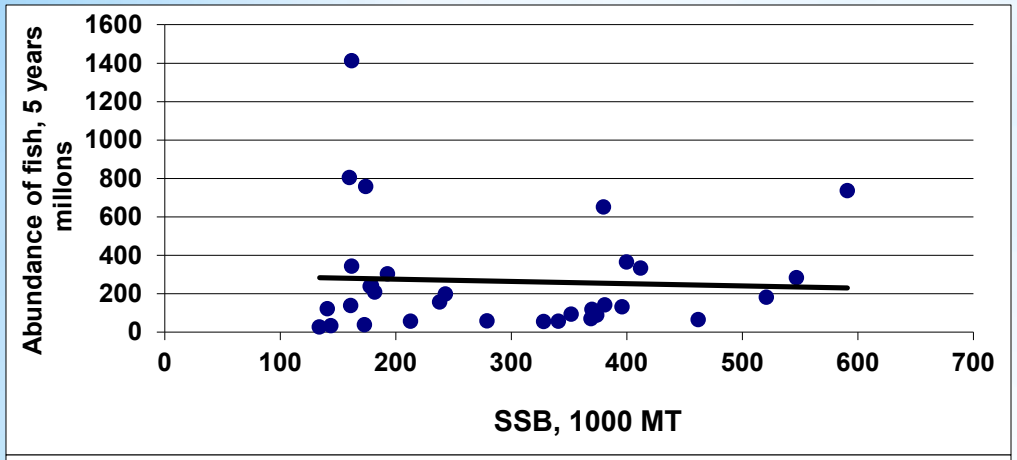
Fig. 4 Time series of estimated biomass, SSB, and catch rate of the Japanese Pacific stock

Source: Mori, Hiyama, 2014

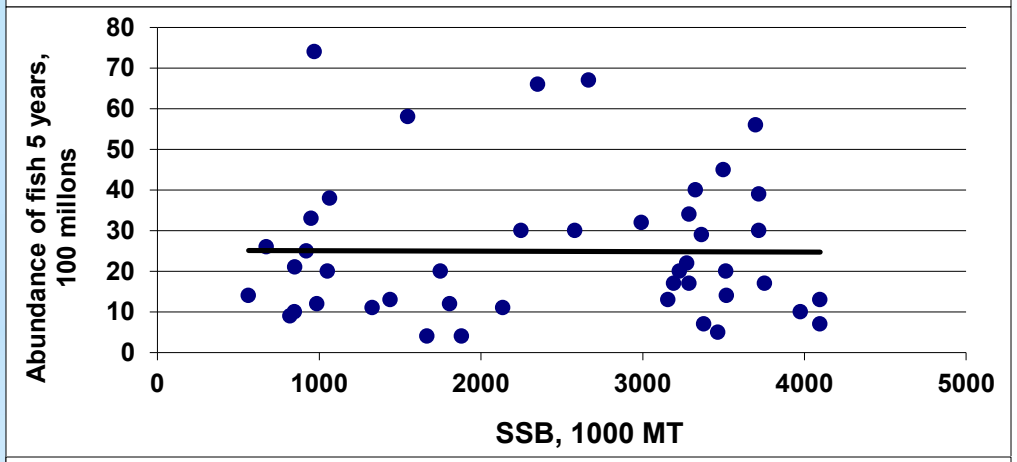
Wakkanai
Hokkaido
Sapporo
Kushiro
Nemuro
Hakodate

The annual world catch of walleye pollock (1000 MT) and fishable biomass in the Gulf of Alaska, Bering Sea and Sea of Okhotsk, 1979-2012 (10 000 MT)

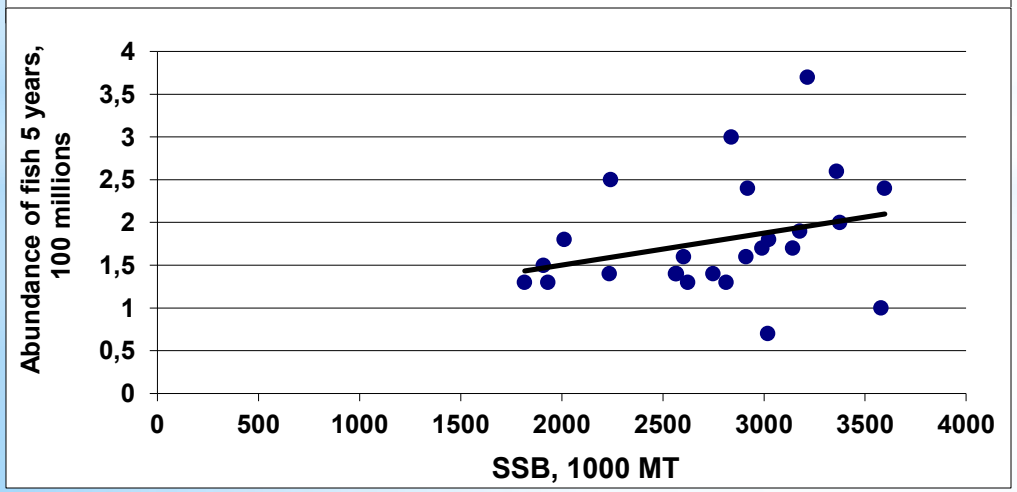




Gulf of Alaska, 1977-2008 (data from Dorn et al., 2013) r= - 0,05

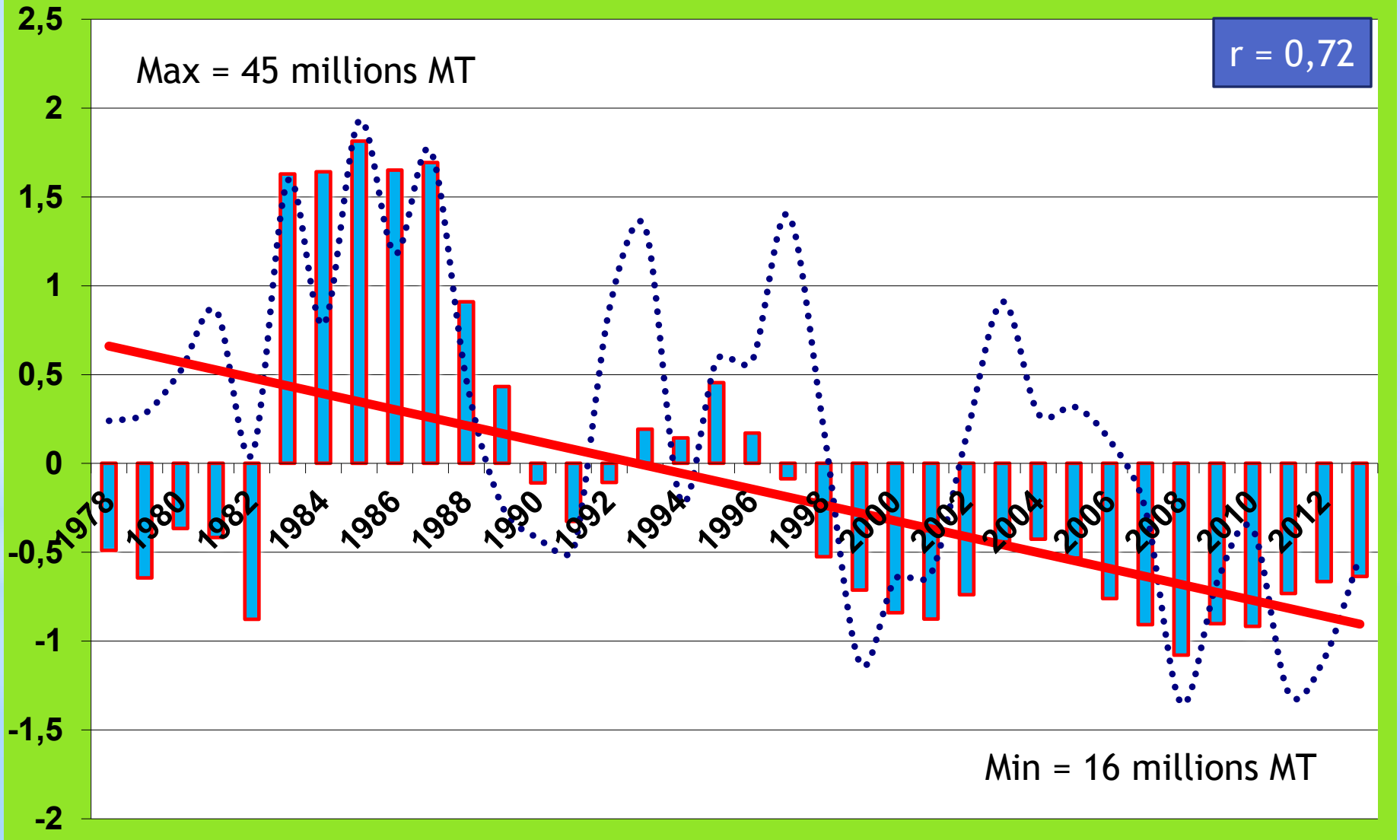


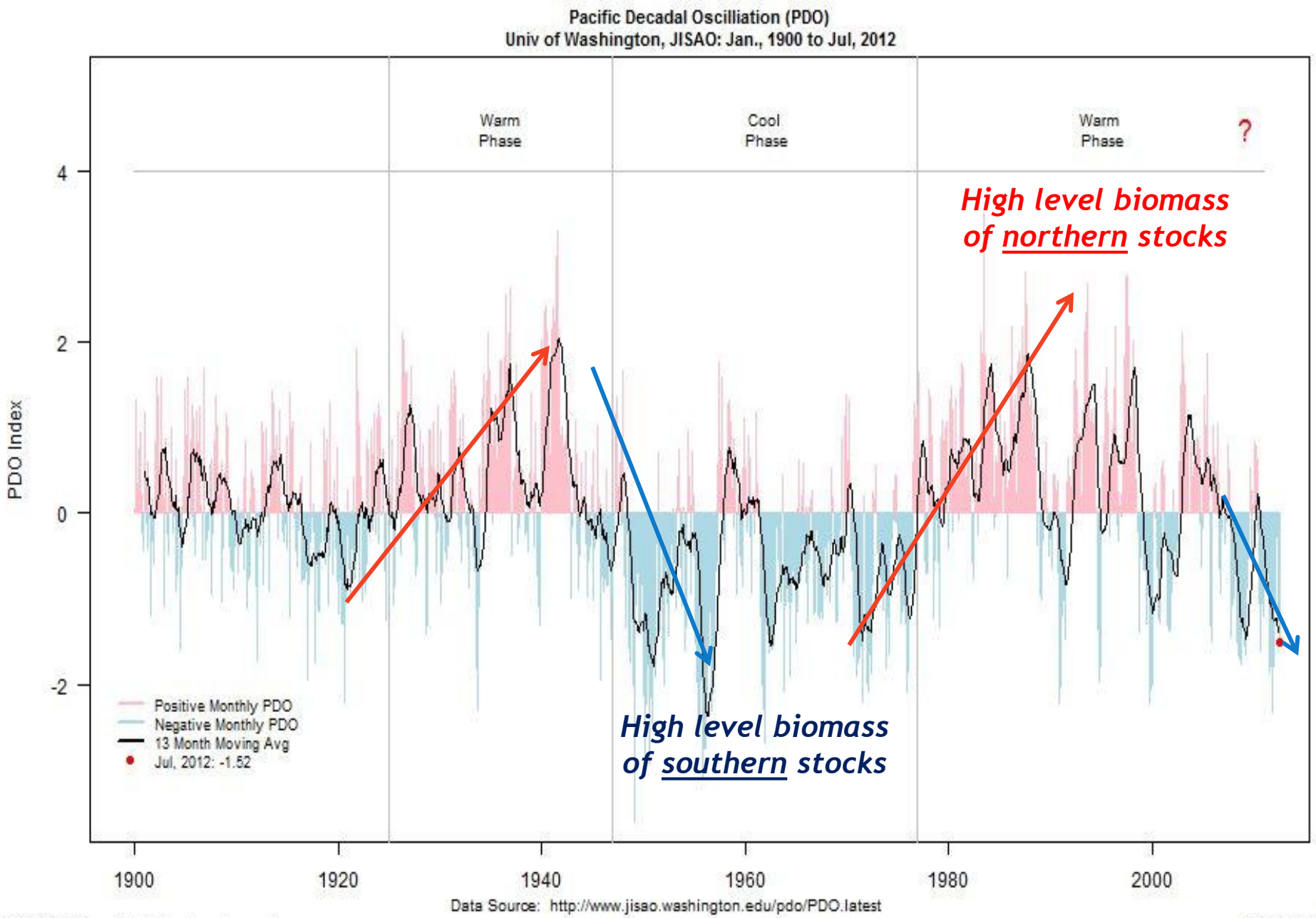
Eastern Bering Sea, 1965-2008 (data from Ianelli et al., 2013) r= - 0,01



Eastern Sea of Okhotsk, 1974-1998 (data from Babayan et al., 2006) r= 0,29

PDO (dotted line) and walleye pollock biomass in Gulf of Alaska, Bering and Okhotsk Seas (bars, 10 million tons) in 1978-2013




Pacific Decadal Oscilliation (PDO)
Univ of Washington, JISAO: Jan., 1900 to Jul, 2012
Warm Phase
Cool Phase
Warm Phase
?
High level biomass of northern stocks
High level biomass of southern stocks
PDO Index
4
2
0
-2
1900
1920
1940
1960
1980
2000
Positive Monthly PDO
Negative Monthly PDO
13 Month Moving Avg
Jul, 2012: -1.52
Data Source: http://www.jisao.washington.edu/pdo/PDO.latest
D Kelly O'Day - http://chartsgraphs.wordpress.com
08/26/ 2012

Walleye pollock biomass variability and recommended fishing mortality

Unit of stock	Min/max biomass, 1000 MT (ratio, years)	Biomass variability	Fishing mortality
Gulf of Alaska	534/3931 (1:7,4) (1977-2013)	Moderate	Moderate level of fishing mortality
Eastern Bering Sea	3387/12883 (1:3,8) (1977-2013)	Low	High level of fishing mortality
Donuthole area & Bogosloff Isl.	100/12792 (1:128) (1979-2013)	Extremely high	Low level of fishing mortality
Navarin area	2500/3300 (1:1,3) (1993-2013)	Low	High level of fishing mortality
Western Bering Sea	224/2310 (1:10,3) (1970-2013)	High	Low level of fishing mortality
Norhtern and Eastern Sea of Okhotsk	4900/12180 1:2,5 (1966-2013)	Low	High level of fishing mortality
Western Sea of Okhotsk	7/1453 (1:207) (1976-2013)	Extremely high	Low level of fishing mortality
Sea of Japan (East Sea)	Early 70s – up to date	High and Extremely high	Low level of fishing mortality

Conclusions

Catch of walleye pollock in 1979-2013 directly depended on a condition of stocks (r=0,85).

In the Gulf of Alaska, eastern Bering Sea and in North and East of the Sea of Okhotsk was not found statistically significant relationship between “parents-recruitment”.

Dynamics of stocks has 2 different types of variability – high and low, for which to apply various fishing mortality rate.

Biomass of a pollock in the Gulf of Alaska, the Bering Sea and in the Sea of Okhotsk depends on variability of PDO. In the 80s, during positive anomalies, average biomass was 38 million tons, and in the last decade, in the period of negative anomalies, twice less.