THE EXPERIENCE OF USING GIS TECHNOLOGY FOR STOCK ASSESSMENTS OF MARINE FISHES

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GOAL

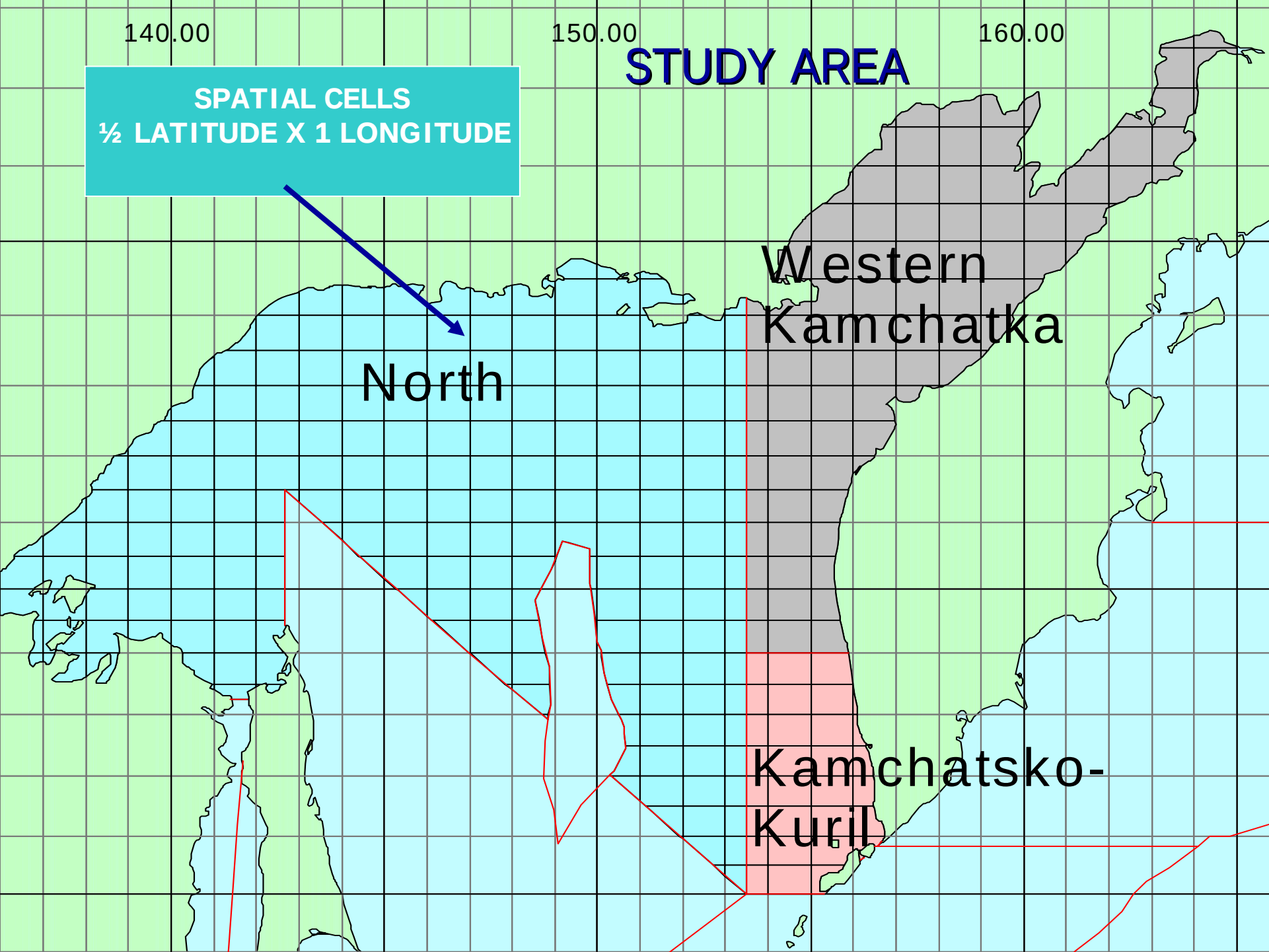
- *to assess the fishable biomass of main commercial marine fishes by use GIS technology*

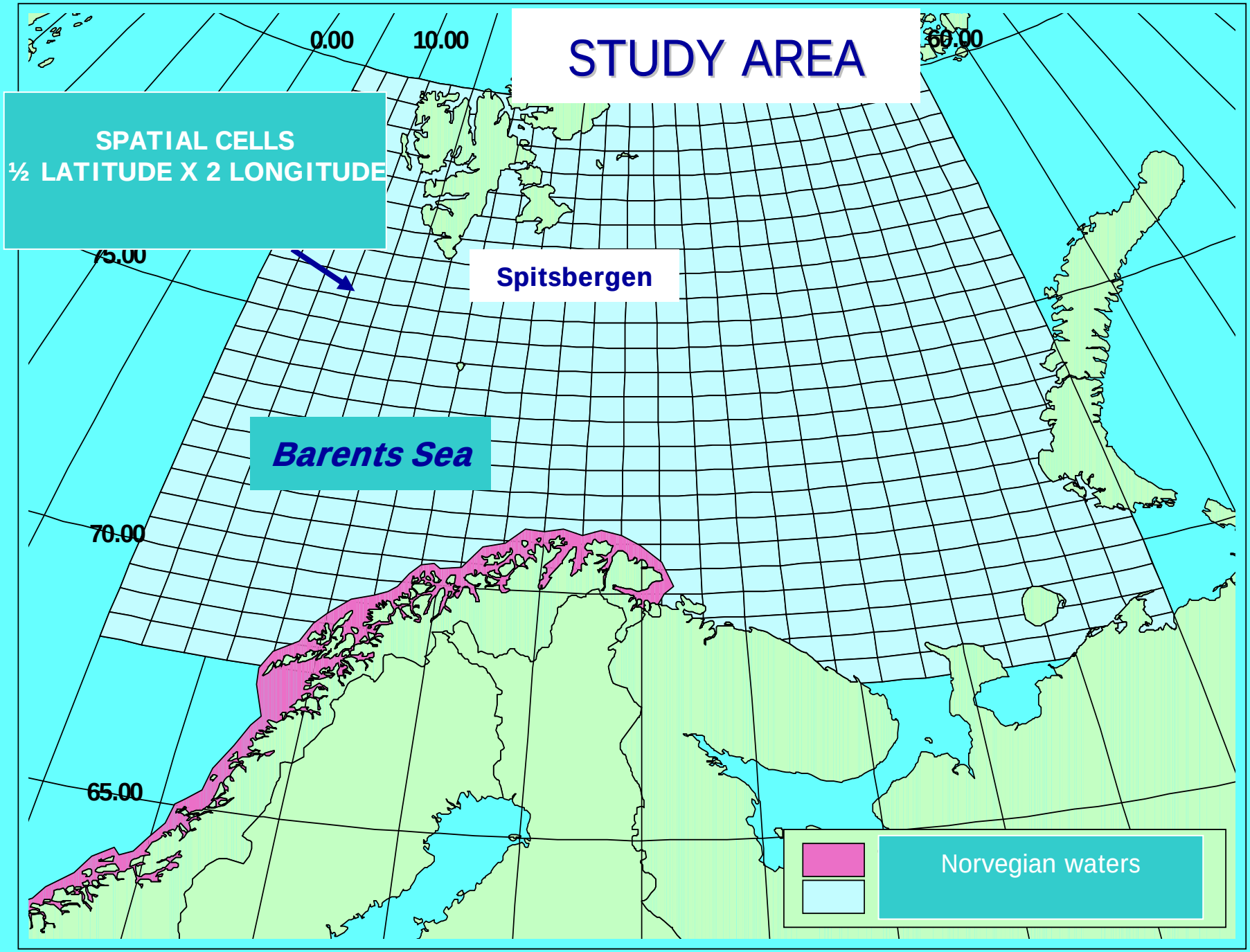
VESSELS DAILY REPORT (VDR)

INCLUDE FOLLOW INFORMATION:

SPECIES: WALLEYE POLLOCK,
NORTH-EAST ARCTIC COD,
GREENLAND HALIBUT

- ***DATE OF REPORT***
- ***LATITUDE***
- ***LONGITUDE***
- ***TARGET SPECIES***
- ***CATCH AMOUNT***
- ***TYPE OF FISHING VESSELS (large and medium)***
- ***TYPE OF FISHING GEARS(bottom and midwater)***
- ***TIME OF THE FISHING OPERATION***


140.00
150.00
160.00
STUDY AREA
SPATIAL CELLS
½ LATITUDE X 1 LONGITUDE
Western
Kamchatka
North
Kamchatsko-
Kuril


STUDY AREA
SPATIAL CELLS
½ LATITUDE X 2 LONGITUDE
Spitsbergen
Barents Sea
0.00
10.00
60.00
70.00
65.00
Norvegian waters

SPECIES	REGION	YEARS	NUMBER OF VDR
Walleye pollock	The Sea of Okhotsk	1998-2007	➢ 31,000
Arctic Cod	Barents Sea	2000-2007	➢ 202,000
Greenland Halibut	Barents Sea	2003-2008	> 2,400

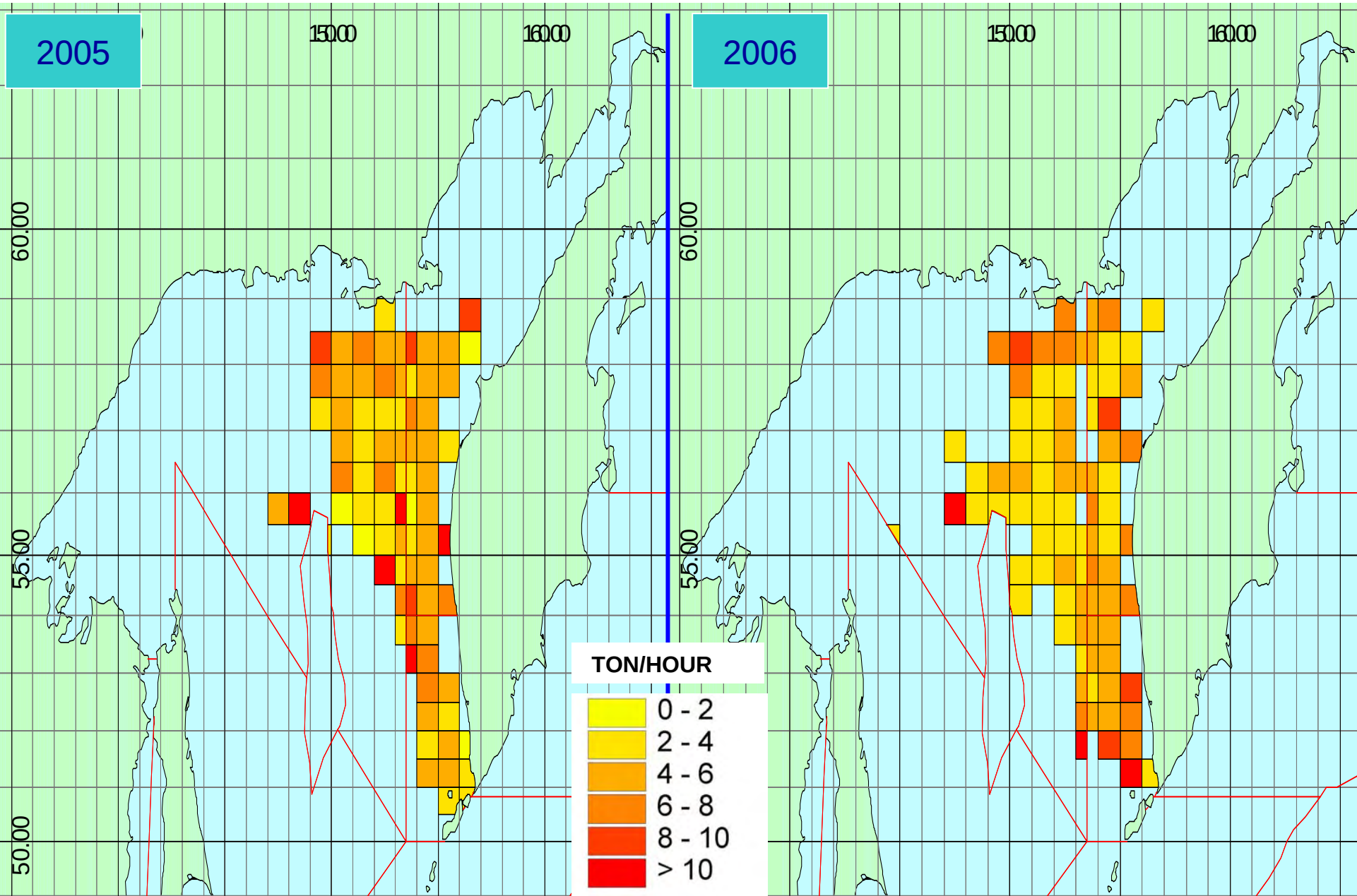
$$P = \sum_{i=1}^{n} \left(\frac{Q_i \times x_i}{q \times k}\right);$$

- ***P - is the fishable biomass, tons;***
- ***Q(i) - is the spatial cell square (i), km²;***
- ***x(i) - is the mean actual catch in each cell (i), t/h of trawling;***
- ***q - is the area of trawling (determined through multiplication of the trawl horizontal opening by the distance covered), km²***
- ***k - is the catchability coefficient (0,2 for Greenland halibut, 0,3 for Arctic cod and 0,4 for Walleye pollock)***

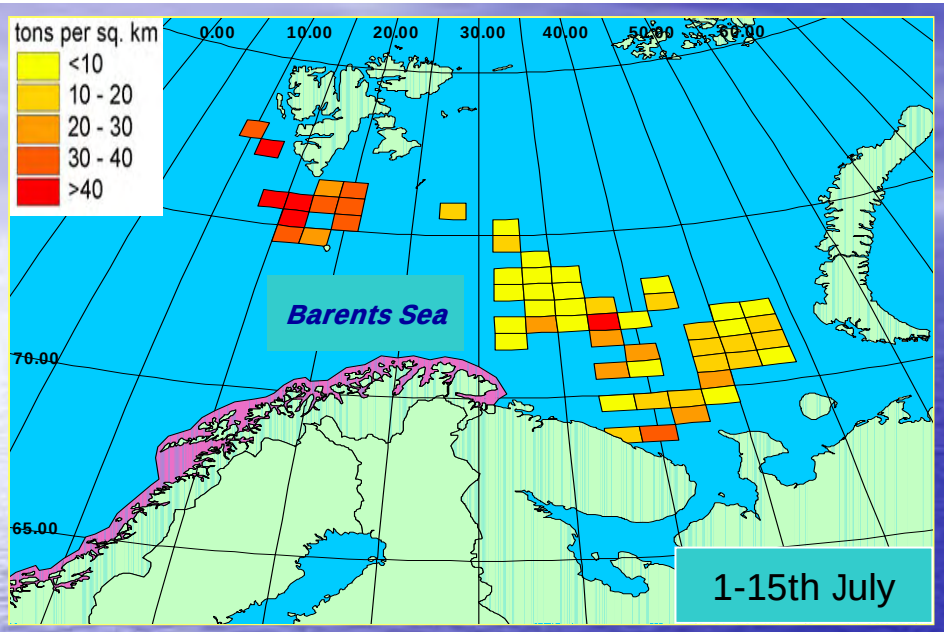
Areas of spatial cells were determined with the GIS software ArcView 3.2 (ESRI)

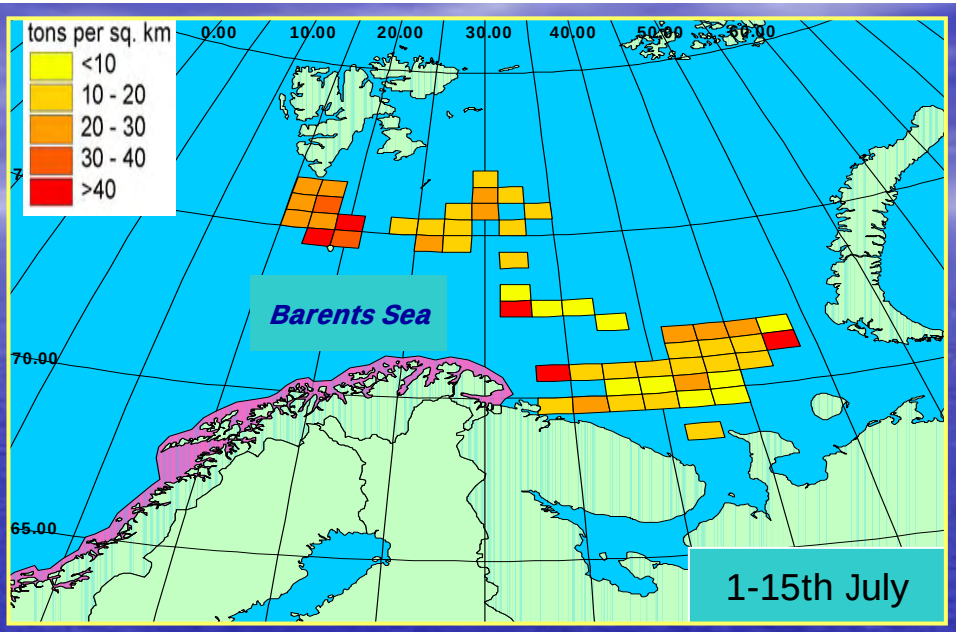
- The monthly biomass was found as the arithmetic mean biomass for 15-days (cod, GH) and 10-days (walleye pollock)
- The annually biomass was found as the arithmetic mean biomass for each month (Walleye Pollock-January-April, Arctic Cod-April-August, Greenland Halibut-September-December)

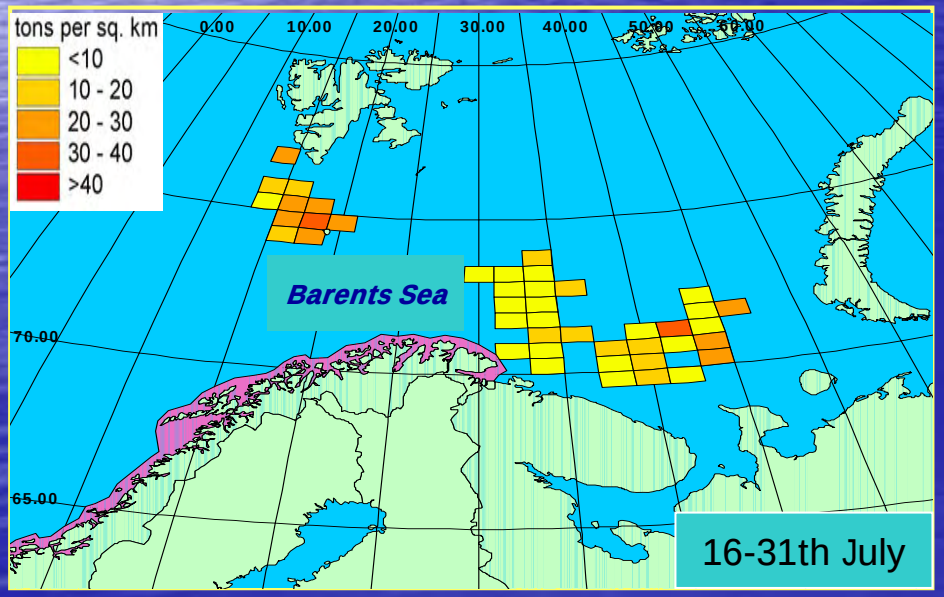
DENSITY DISTRIBUTION OF WALLEYE POLLOCK IN MARCH 2005-2006

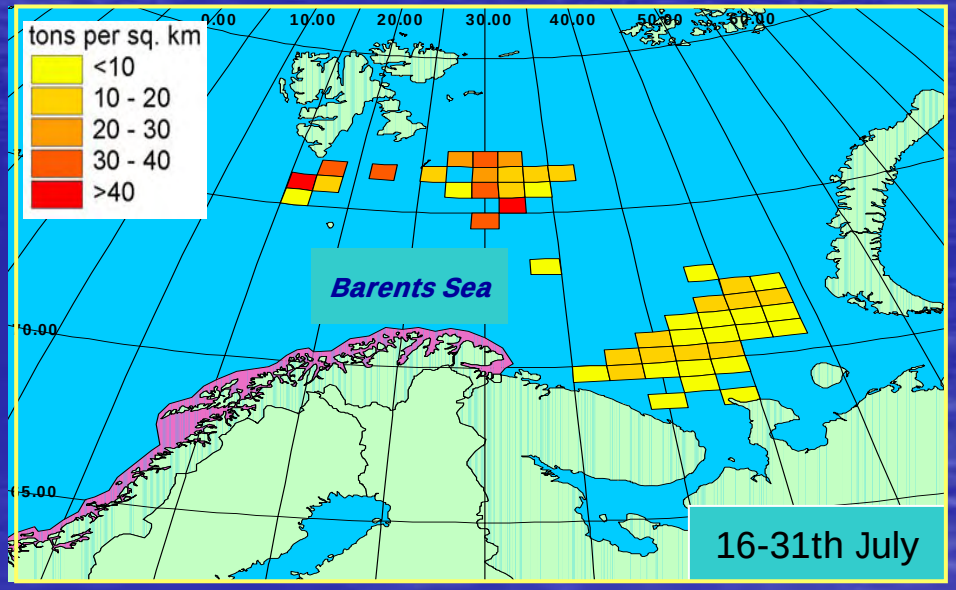


DENSITY DISTRIBUTION OF ARCTIC COD CATCHES IN 2005 2006

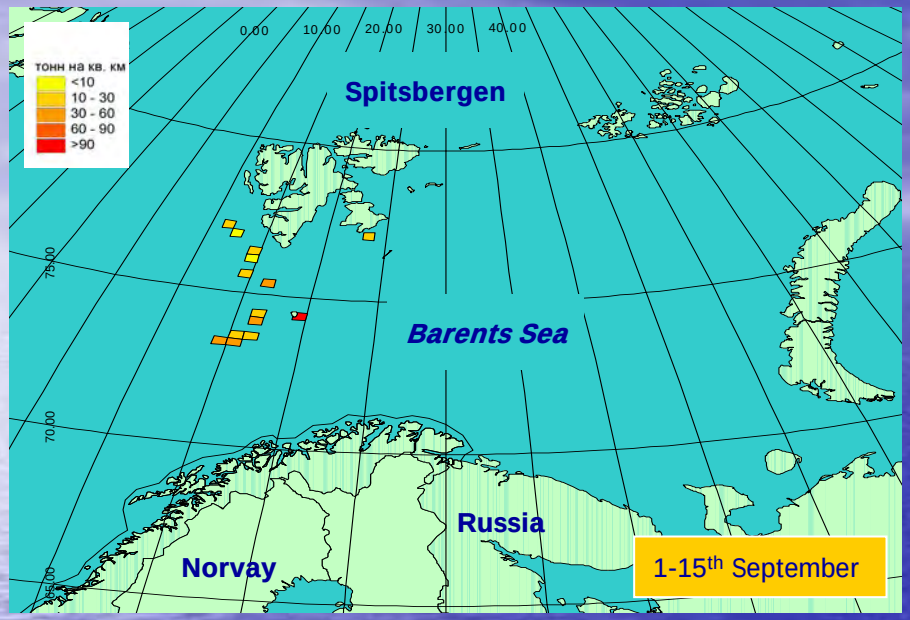


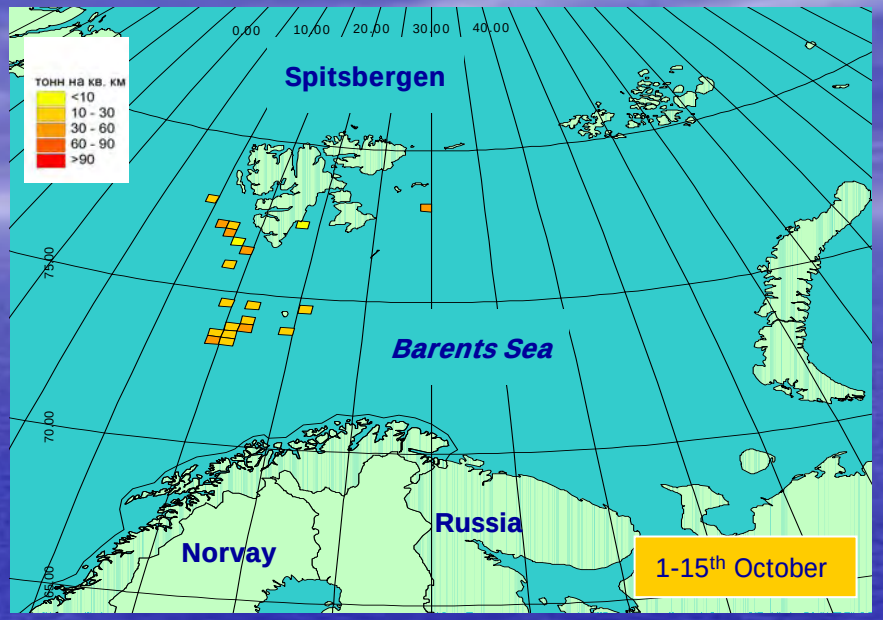


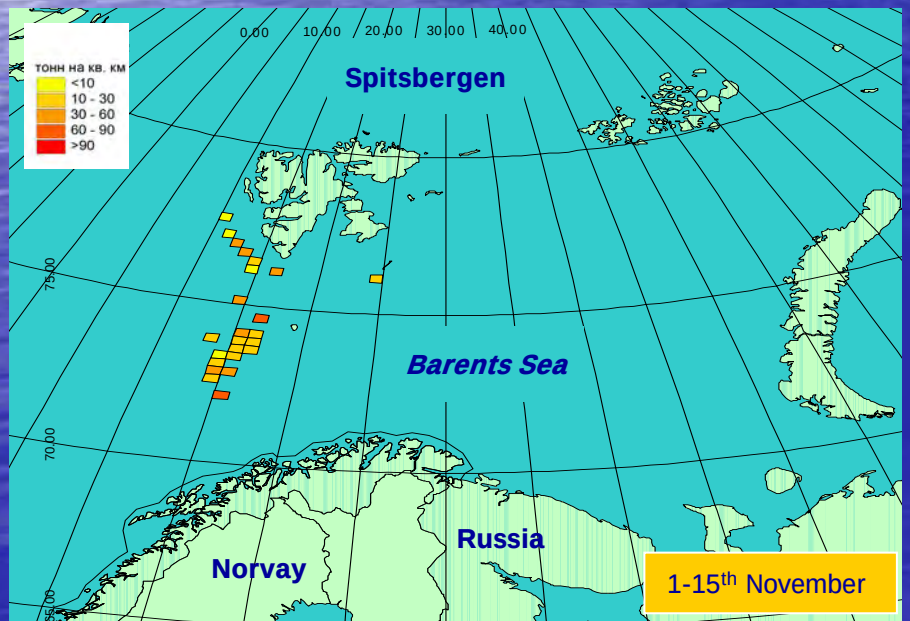




DENSITY DISTRIBUTION OF GREENLAND HALIBUT IN SEPTEMBER-DECEMBER 2005







FREEQUENCY DISRIBUTION OF WALLEYE POLLOCK AND ARCTIC COD IN COMMERCIAL CATCHES (logarithm scale, ton/hour)

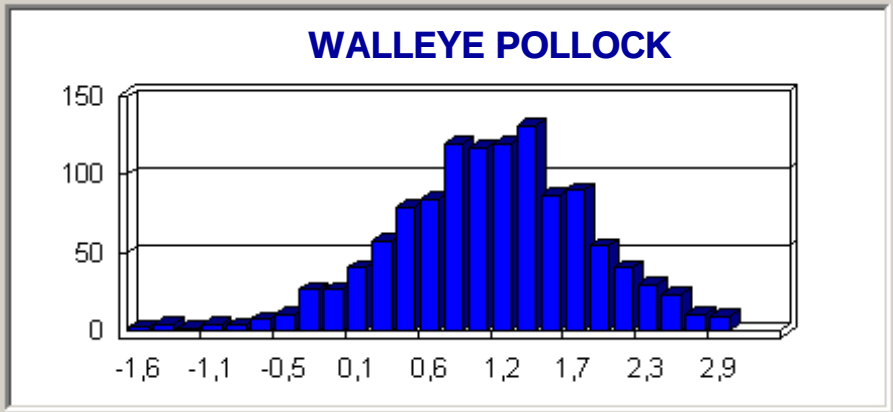
Статистика mint1999big_kk_poly

Поле

LN_UL_VREM

Статистика:

Количество:	1173
Минимум:	-1,630000
Максимум:	2,951000
Сумма:	1360,951000
Среднее:	1,160231
Ср. кв. откл.:	0,744666



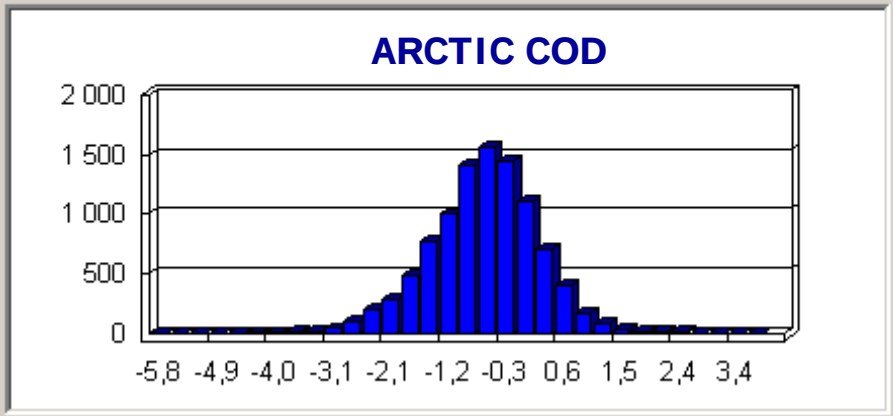
Статистика tr2007na_y_poly_pril

Поле

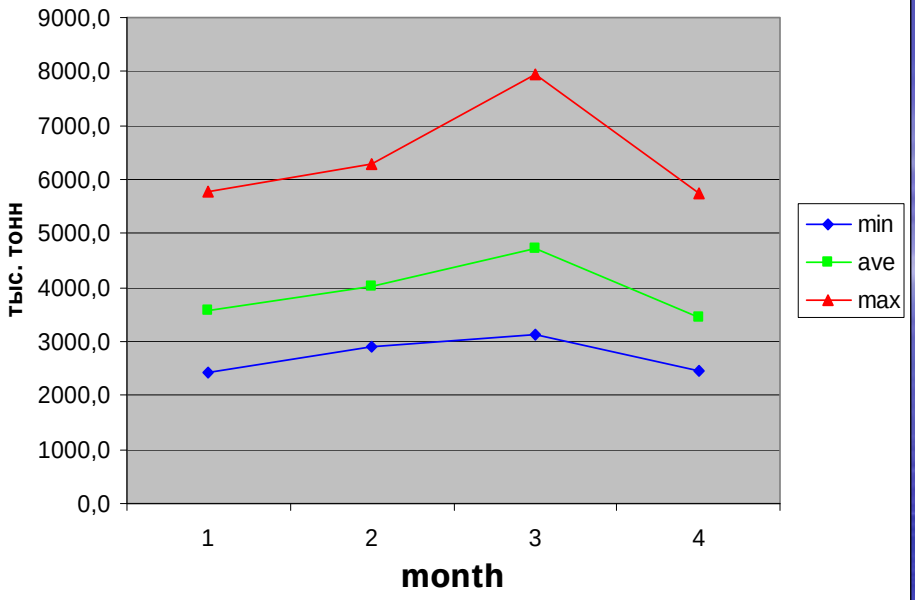
LN_UL_VREM

Статистика:

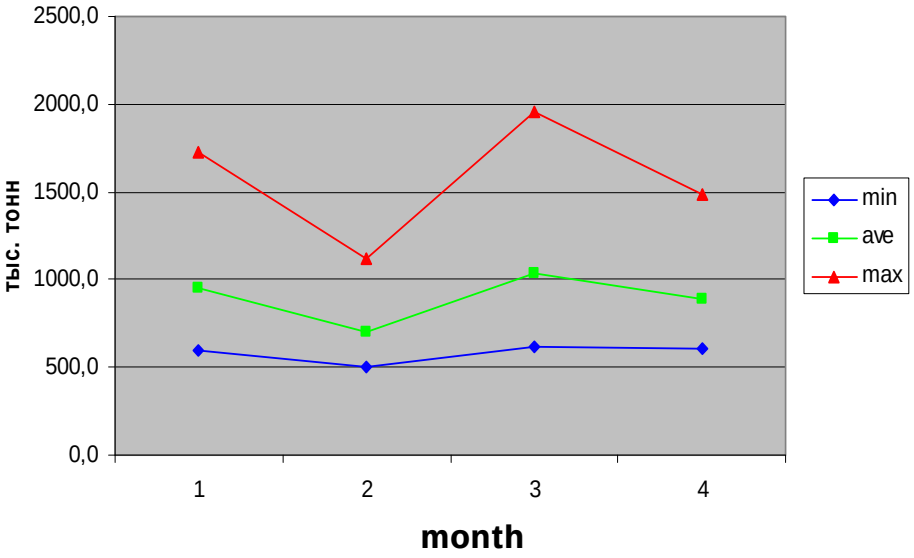
Количество:	9858
Минимум:	-5,809000
Максимум:	3,832000
Сумма:	-5293,319003
Среднее:	-0,536957
Ср. кв. откл.:	0,836359



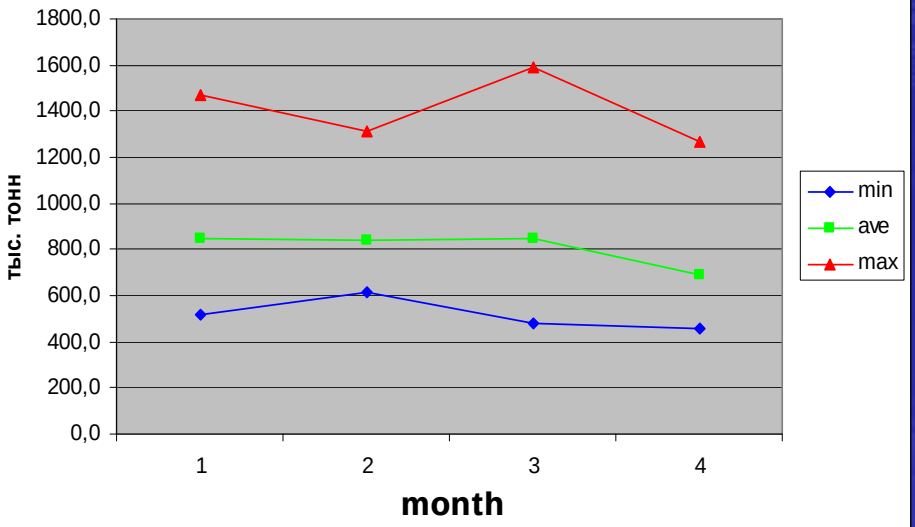
FISHABLE BIOMASS OF POLLOCK IN THE SEA OF OKHOTSK OBTAINED BY GIS METHOD, 1999



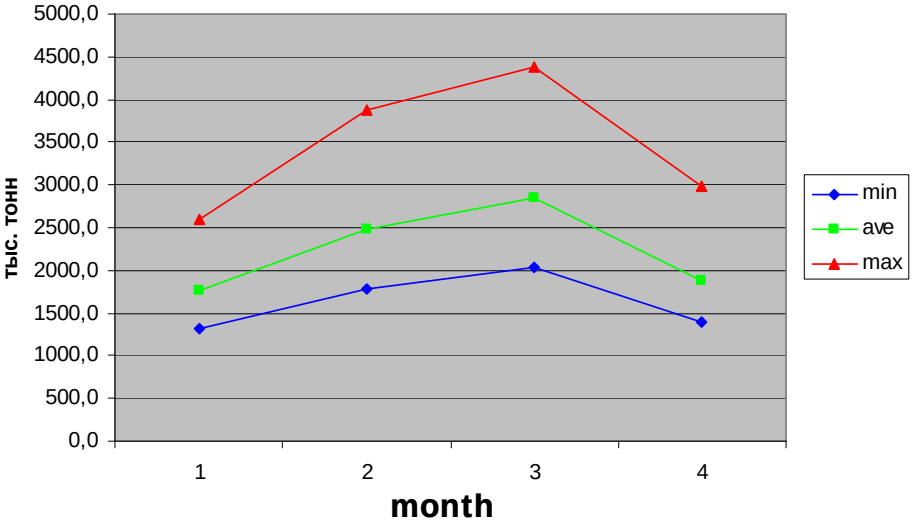
FISHABLE BIOMASS OF POLLOCK IN KURIL-KAMCHATKA REGION OBTAINED BY GIS METHOD, 1999



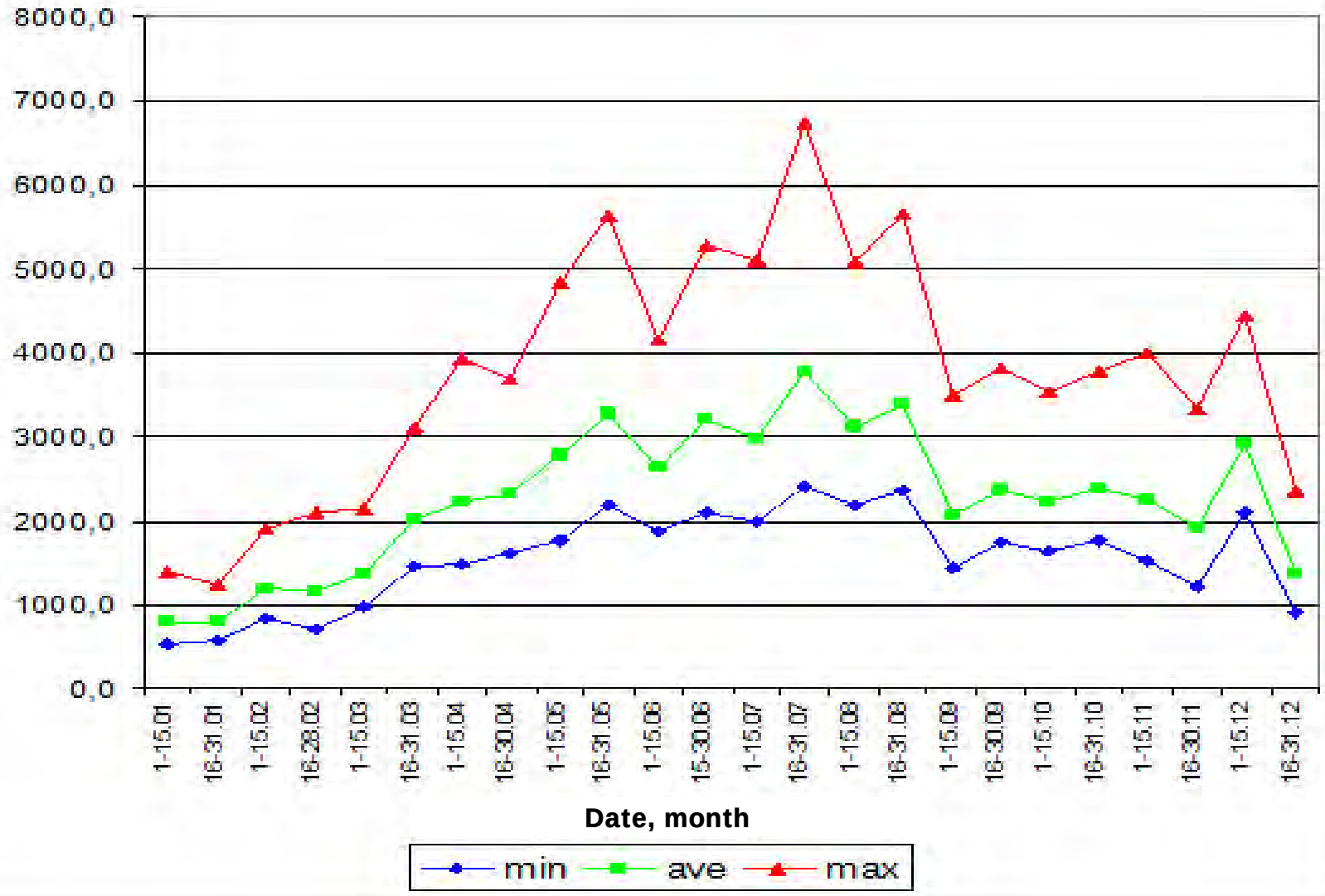
FISHABLE BIOMASS OF POLLOCK IN THE WEST KAMCHATKA REGION OBTAINED BY GIS METHOD, 1999



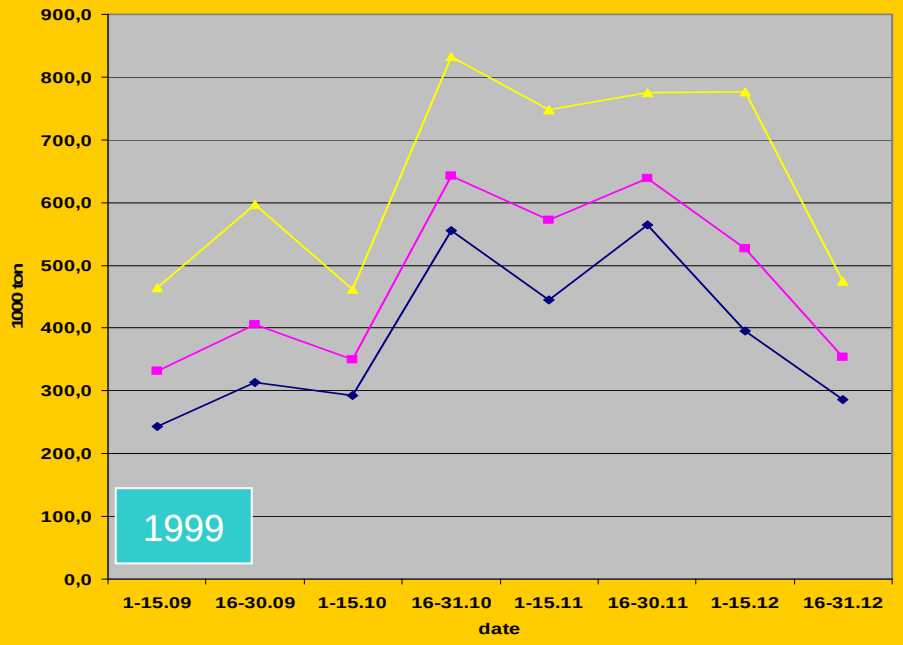
FISHABLE BIOMASS OF POLLOCK IN THE NORTH REGION OBTAINED BY GIS METHOD, 1999

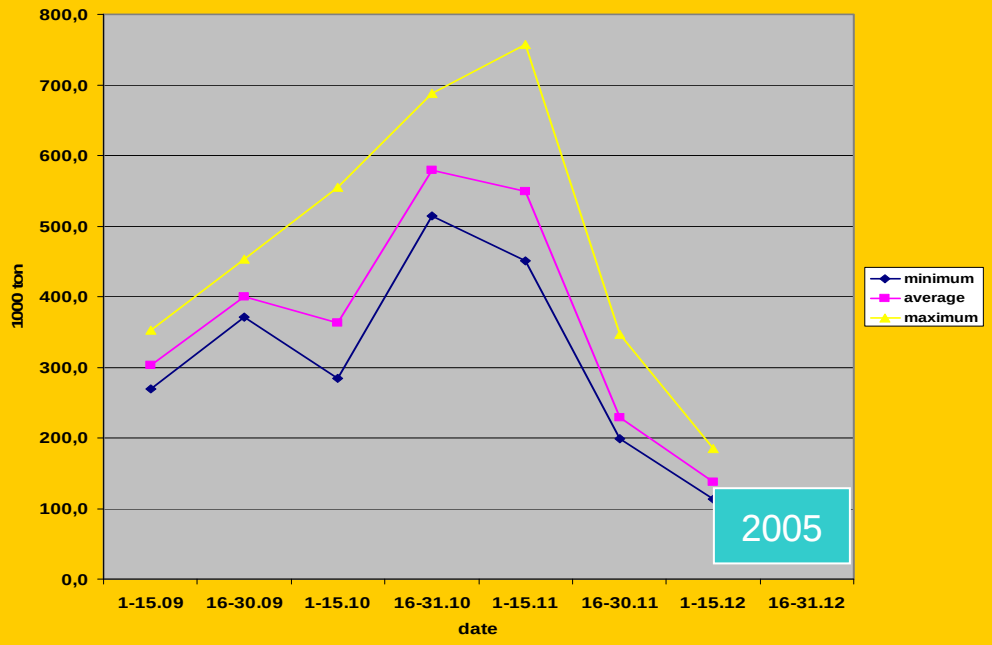


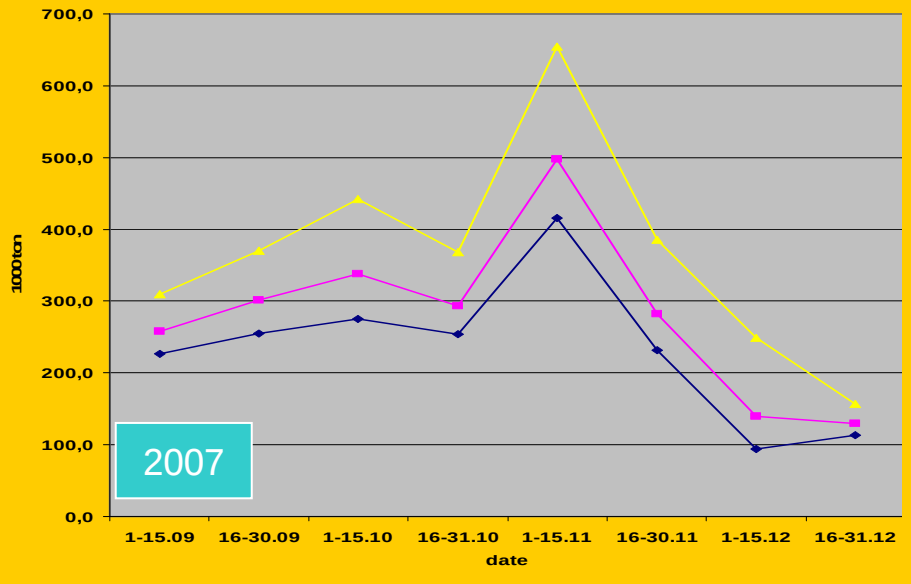
FISHABLE BIOMASS OF ARCTIC COD IN BARENTS SEA OBTAINED BY GIS METHOD, 2007

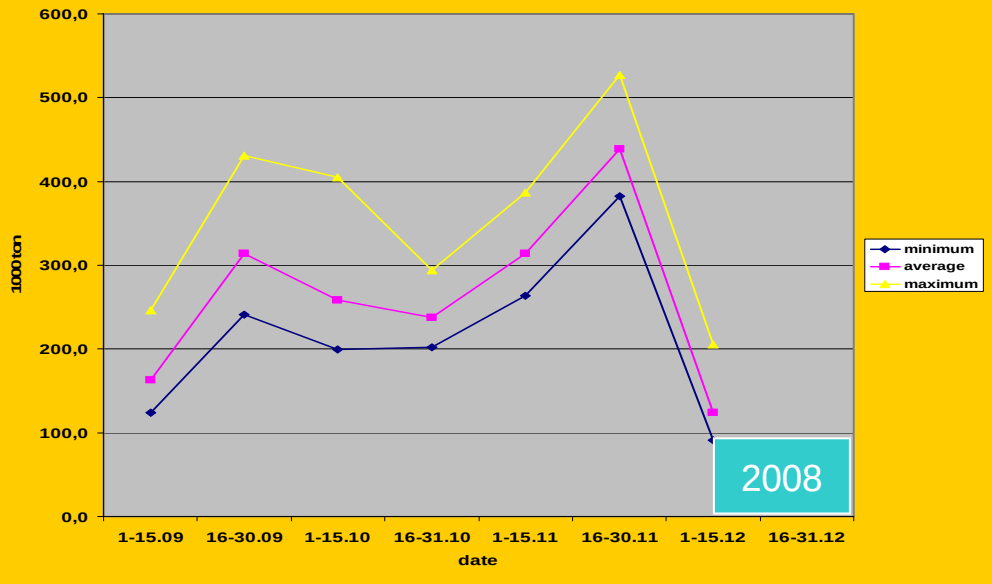


FISHABLE BIOMASS OF GREENLAND HALIBUT IN BARENTS SEA OBTAINED BY GIS METHOD

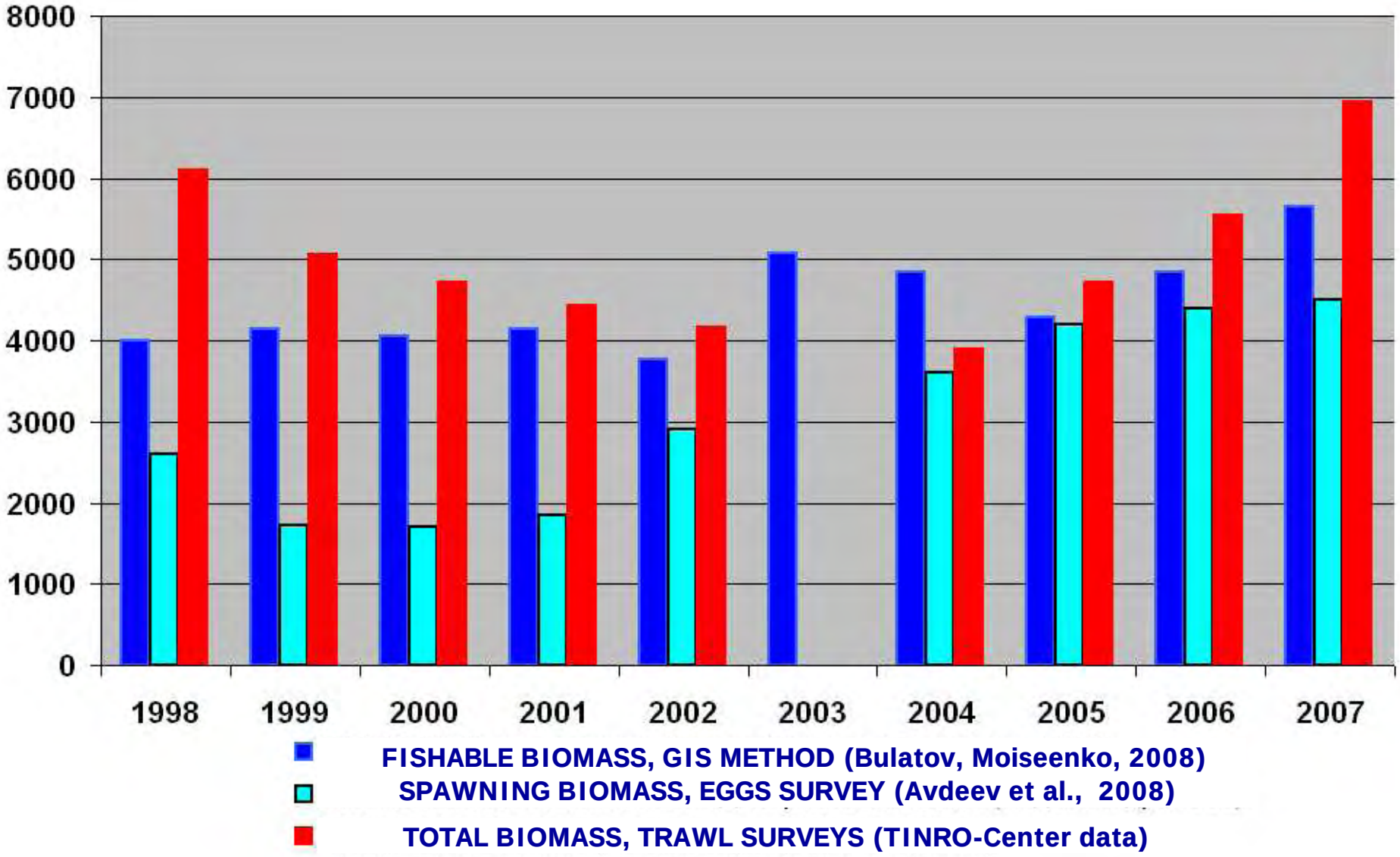




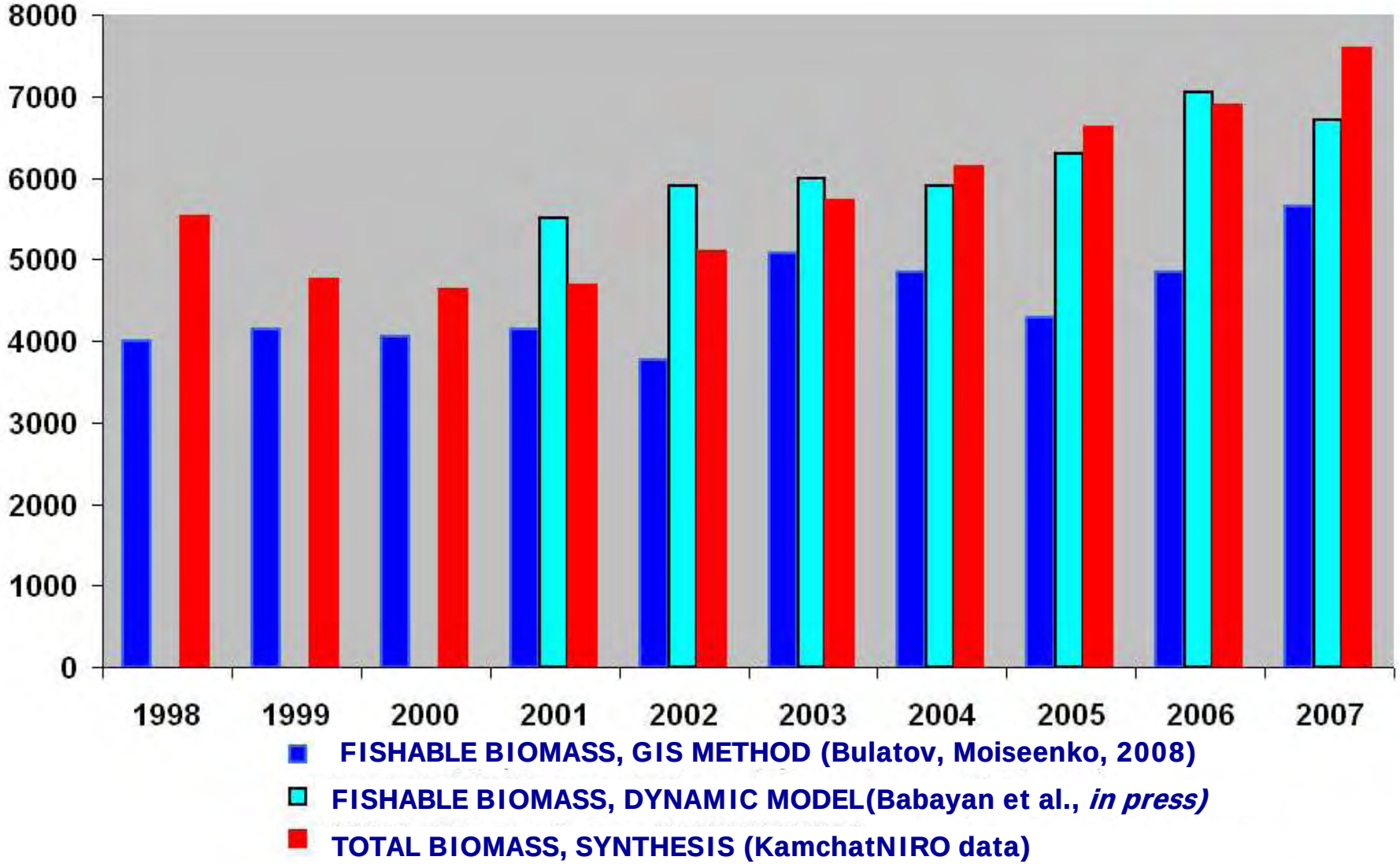




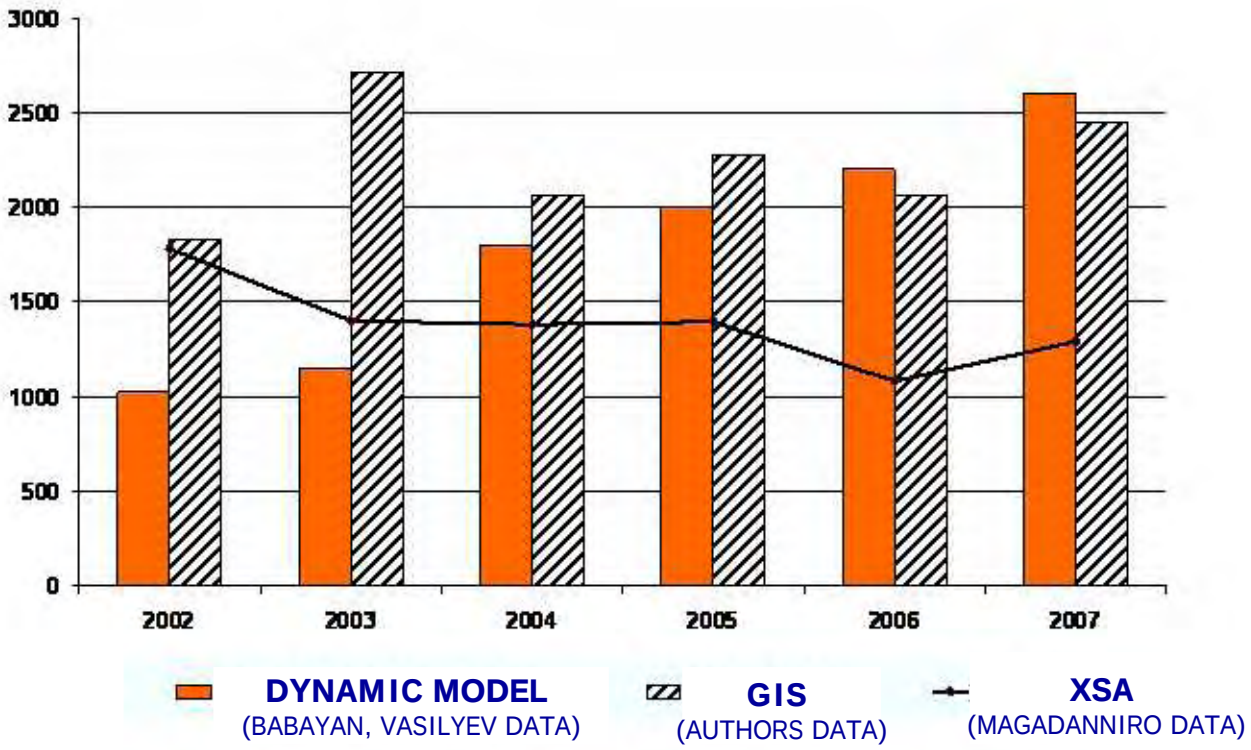
BIOMASS OF WALLEYE POLLOCK IN THE SEA OF OKHOTSK, 1998-2007 (THOUS.T)



BIOMASS OF WALLEYE POLLOCK IN THE SEA OF OKHOTSK, thous. t

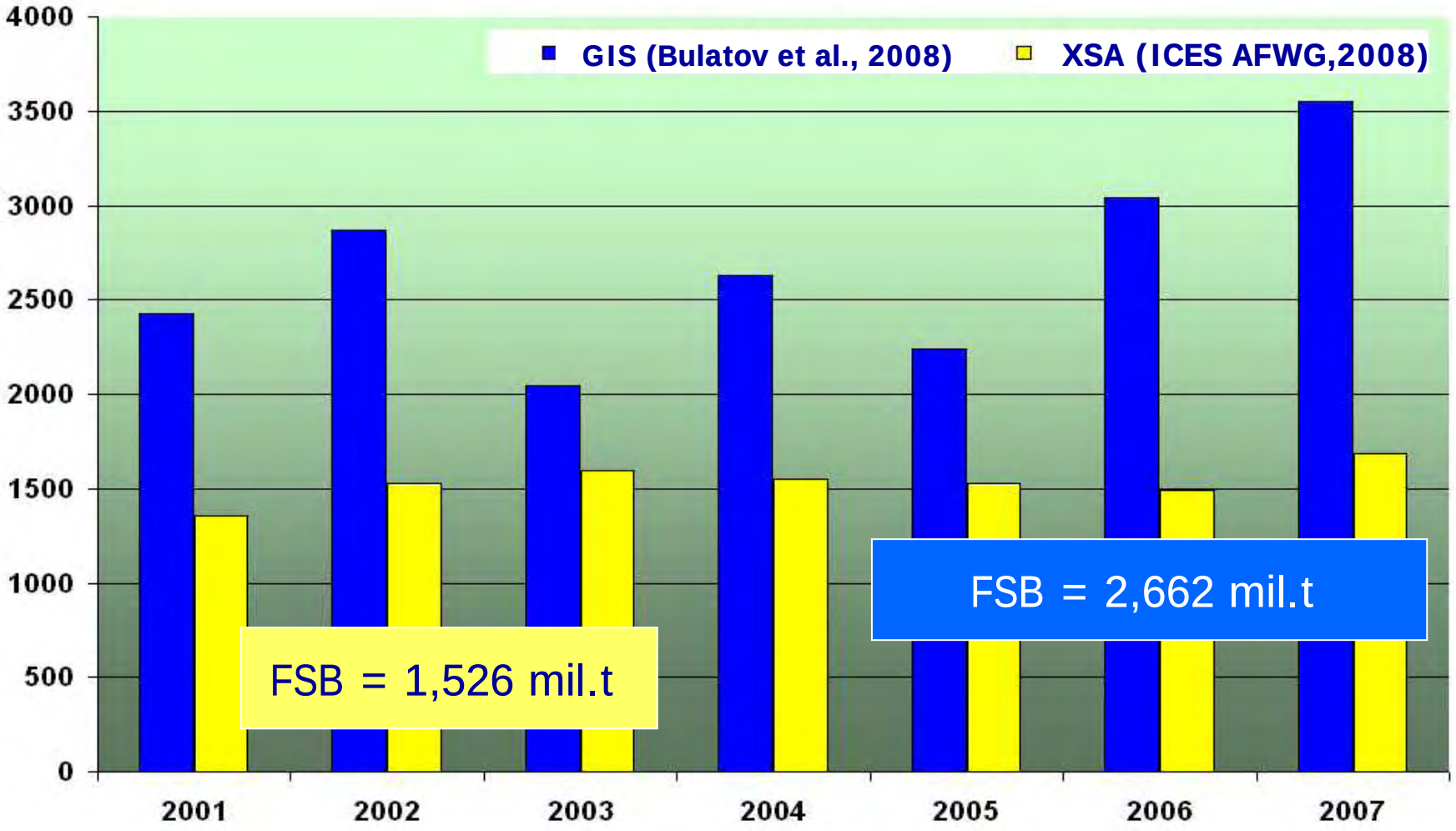


ASSESSMENT OF FISHABLE BIOMASS OF WALLEYE POLLOCK IN THE NORTH OF OKHOTSK SEA BY DIFFERENT METHODS (thousands ton)

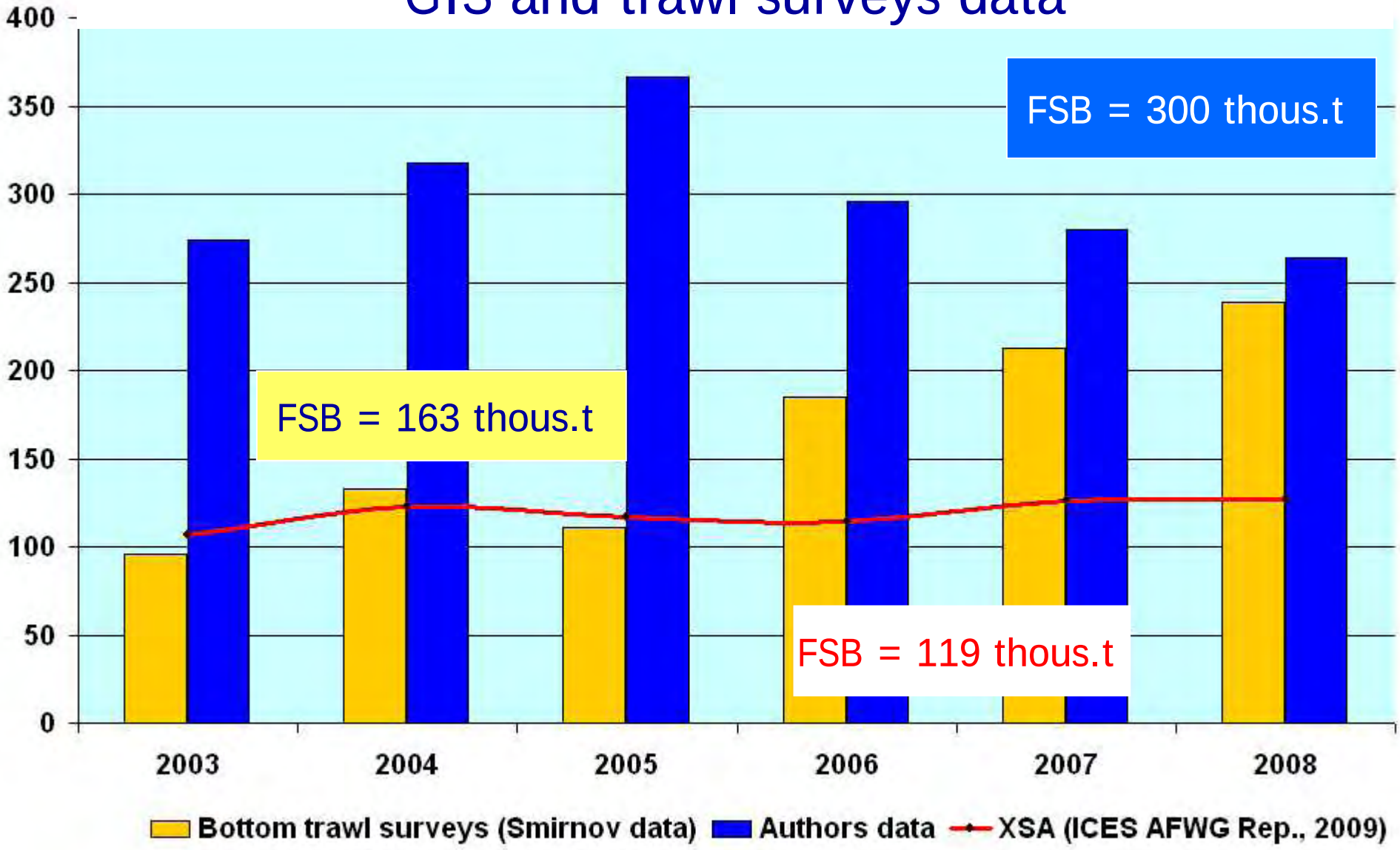


Bulatov, Moiseenko, 2008
Voprosy Rybolovstva, Vol.9, №4 (36)

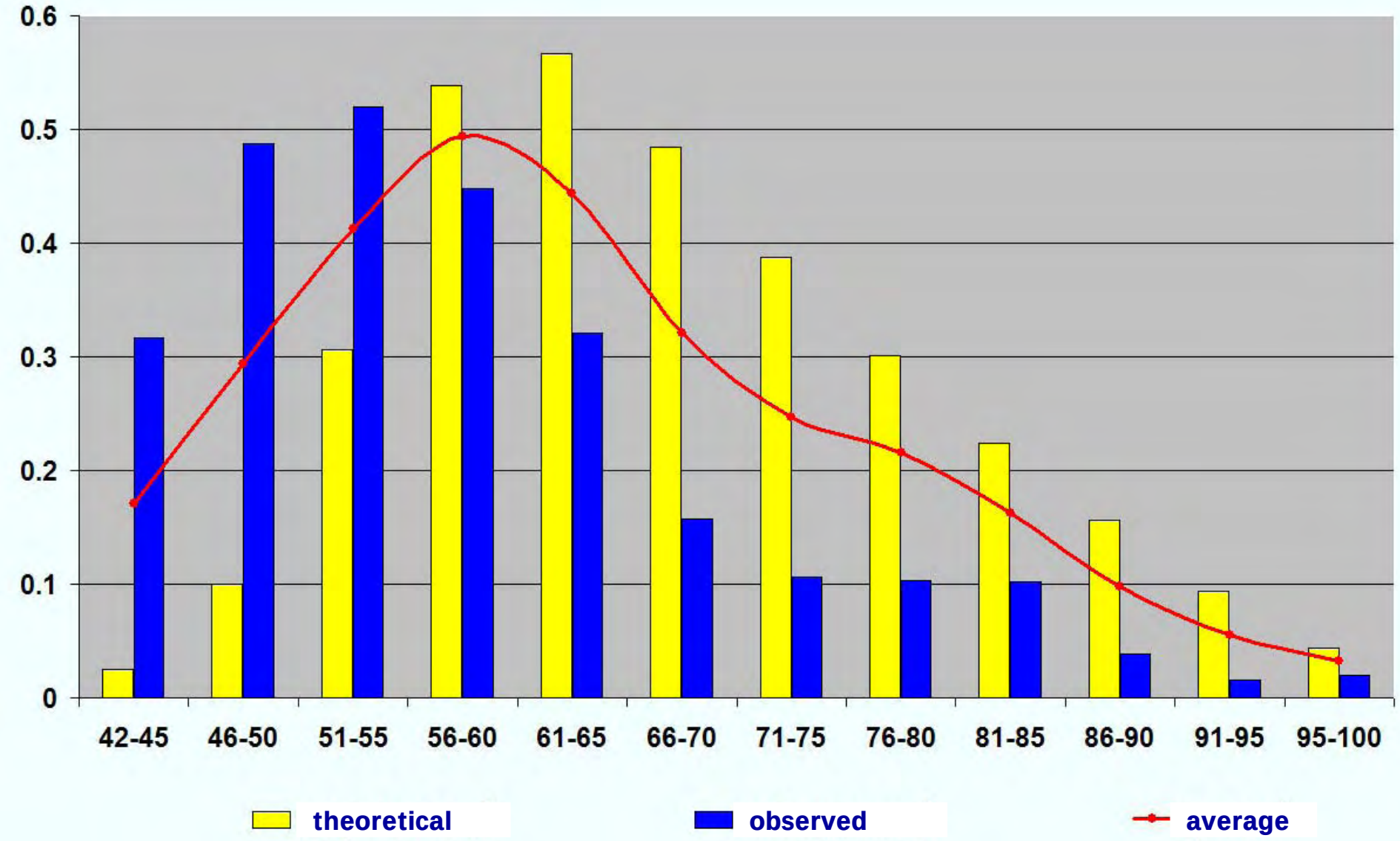
STOCK ASSESSMENT BIOMASS OF COD OBTAINED BY GIS AND XSA, THOUS.T



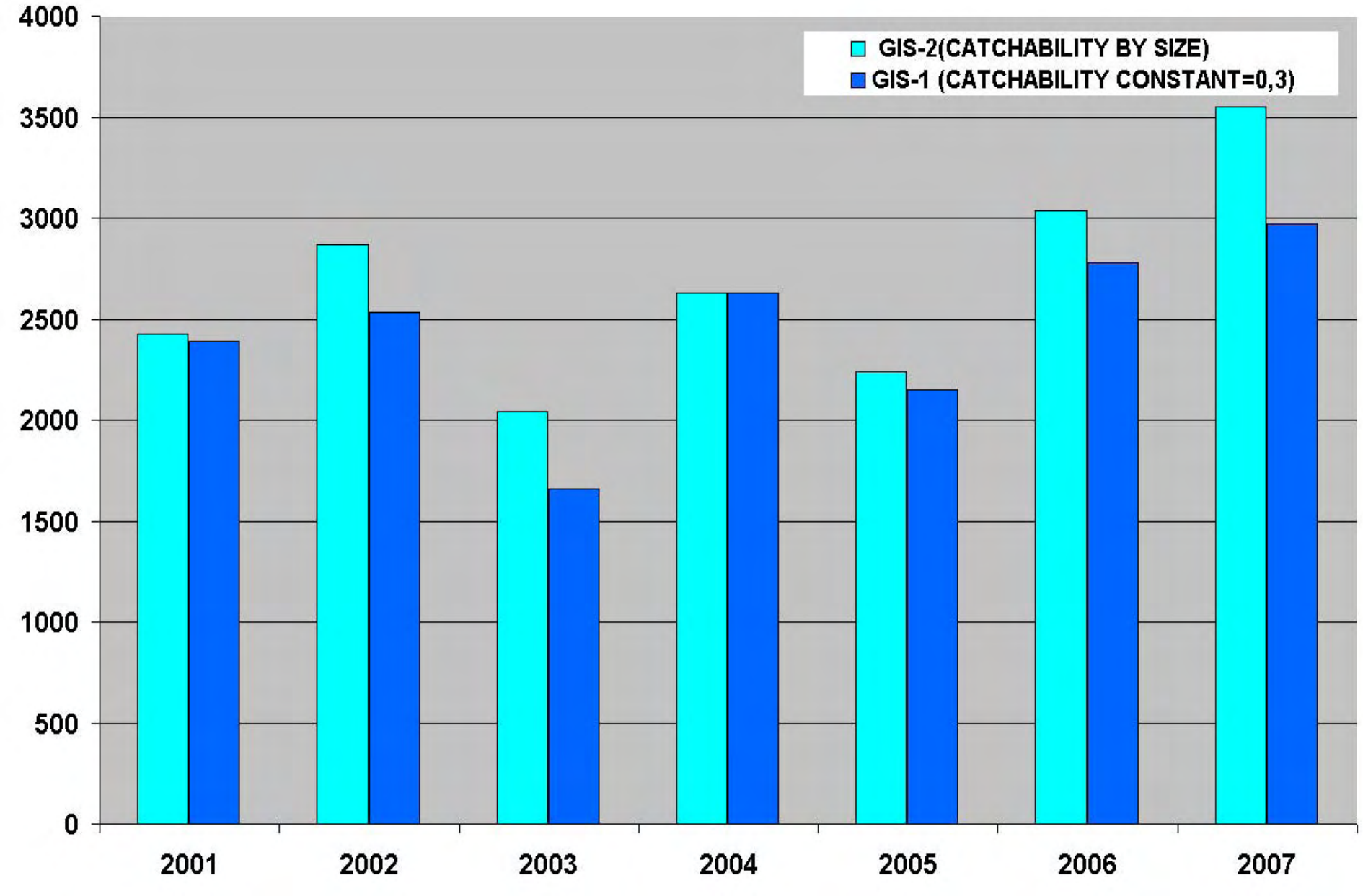
Greenland Halibut biomass value obtained by XSA, GIS and trawl surveys data



CATCHABILITY COEFFICIENT VALUES ACCORDING TO THEORETICAL AND OBSERVED APPROACHES



STOCK ASSESSMENT FISHABLE BIOMASS OF ARCTIC COD ACCORDING GIS-1 AND GIS-2 VERSIONS, thous. tons



Conclusions

- Comparison of GIS with trawl and ichthyoplankton surveys demonstrated that the results of stock assessment biomass were very close.

- Comparison of GIS with analytical approaches XSA and TISVPA shows that the biomass estimate for GIS is much larger. However, the comparison of GIS with analytical approaches dynamic model and SYNTHESIS, shows that the results of stock assessment biomass were very close.

- The improved GIS version, which includes catchability coefficient based on the group size of cod, shows higher accuracy in results compare to the 1-st version of GIS.

- Applying the GIS technology allows us to do the stock assessment estimates not only for Walleye pollock, Arctic cod and Greenland halibut, but also for other commercial fishes.

THANK YOU

FOR YOUR

ATTENTION