THE ESTIMATION OF BARENTS SEA COD STOCK BY THE GIS-METHODOLOGY

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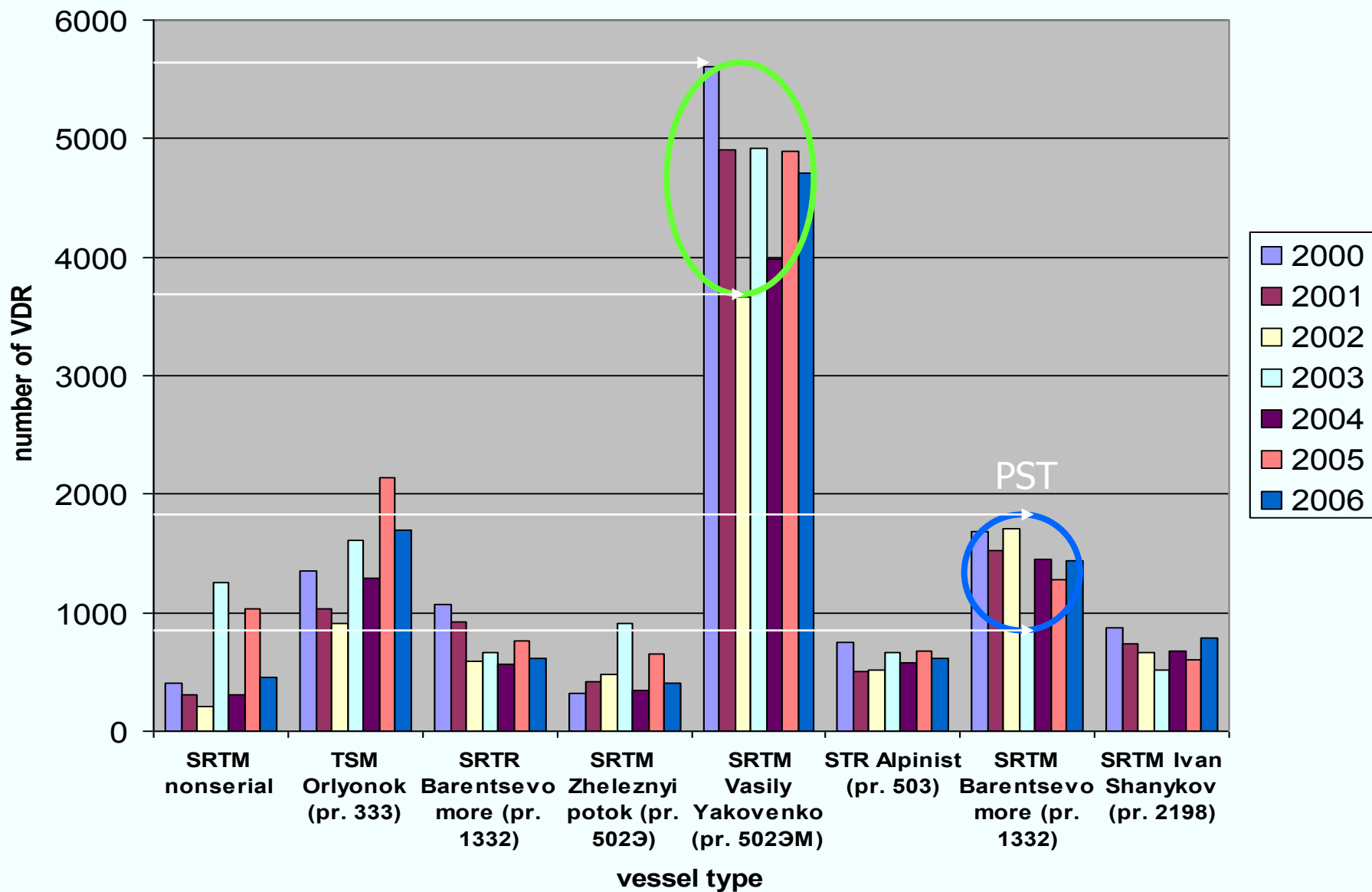*Federal Research Institute of Fisheries and Oceanography (VNIRO),*
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GOAL

- to assess the fishable biomass and total allowable catch of Arctic cod

  in 2000-2006

NUMBER OF VESSELS' DAILY REPORTS (VDRs) SUBMITTED FOR THE SURVEYED AREA IN 2000-2006

Year \ Number of VDRs	Total number of VDRs	Number of VDRs with the known trawl type	Percentage of VDRs with the known trawl type (%)
2000	36,797	14,458	39,3
2001	31,118	13,220	42,5
2002	23,716	11,236	47,4
2003	20,095	11,052	55,0
2004	22,111	13,712	62,1
2005	21,746	10,969	50,5
2006	25,485	14,381	56,5
Total	181,068	89,028	49,2

NUMBER OF VESSELS' DAILY REPORTS VS VESSEL TYPES

THE TOTAL CATCH DISTRIBUTION BETWEEN VESSEL TYPES, %%

Type of Vessel	2000	2001	2002	2003	2004	2005	2006
Vasiliy Yakovenko	40.3	40.1	35.8	28.9	28.6	27.1	33.0
Orlyonok	15.7	14.4	12.7	17.4	15.2	18.6	18.4
Barentsevo more	14.2	16.4	22.0	9.9	18.3	15.3	16.6
Others	29.8	29.1	29.5	43.8	37.9	39.0	32.0
Total	100	100	100	100	100	100	100

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

- **P** - is the fishable biomass, tons;

- **Q(i)** - is the area of each square (i), km2;

- **x(i)** - is the mean actual catch in each square (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 which totaled 0.3 (Serebrov, 1988).

  – Areas of polygons (0.5 degree of latitude x 2 degree of longitude) were determined with the GIS software ArcView 3.2 (ESRI)

  – The cod monthly biomass was found as the arithmetic mean biomass for two 15-days periods

FISHABLE BIOMASS AND CATCH OF ARCTIC COD IN 1977-2006, thousands ton (data from AFWG Report 2007)

Legend:
- CATCH, 10 THOUS. T (ICES ADVICE 2007)
- FISHABLE STOCK BIOMASS, 10 THOUS.T
- RATE OF EXPLOITATION,%

B_{MAX}
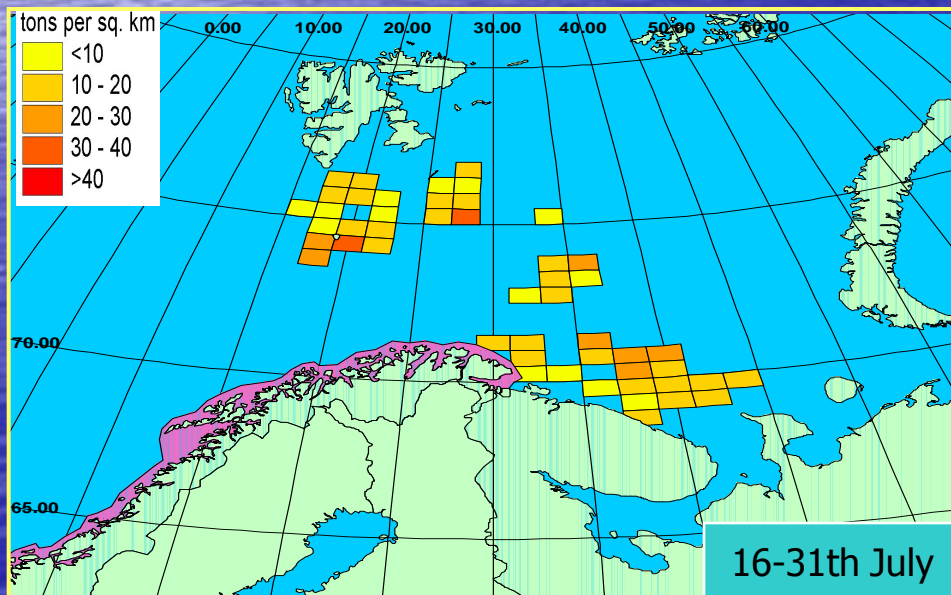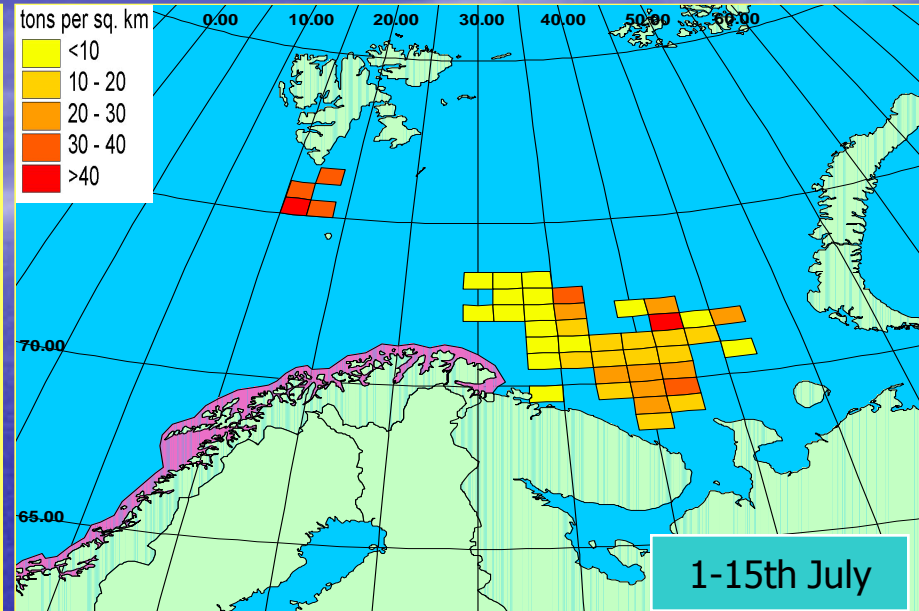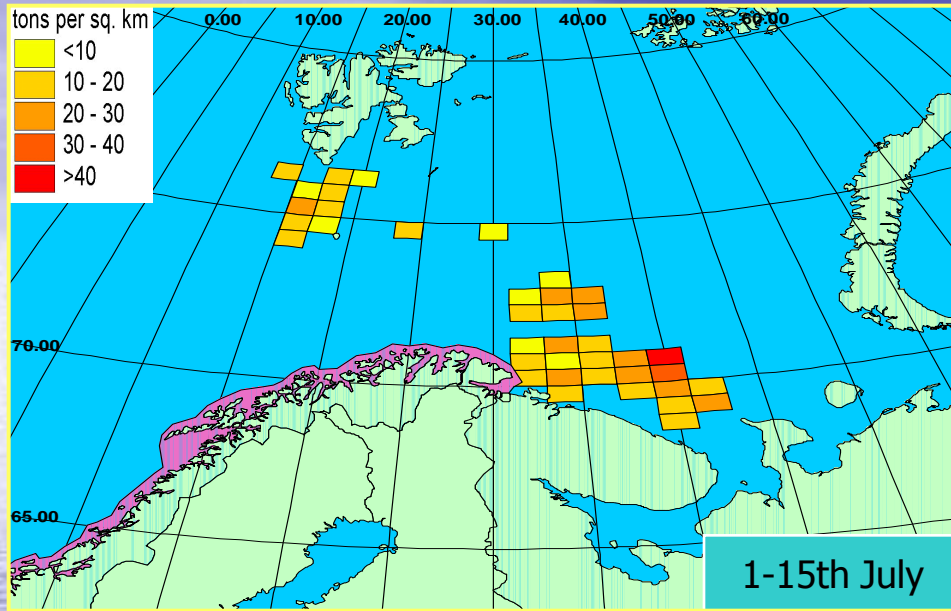
C_{MAX}
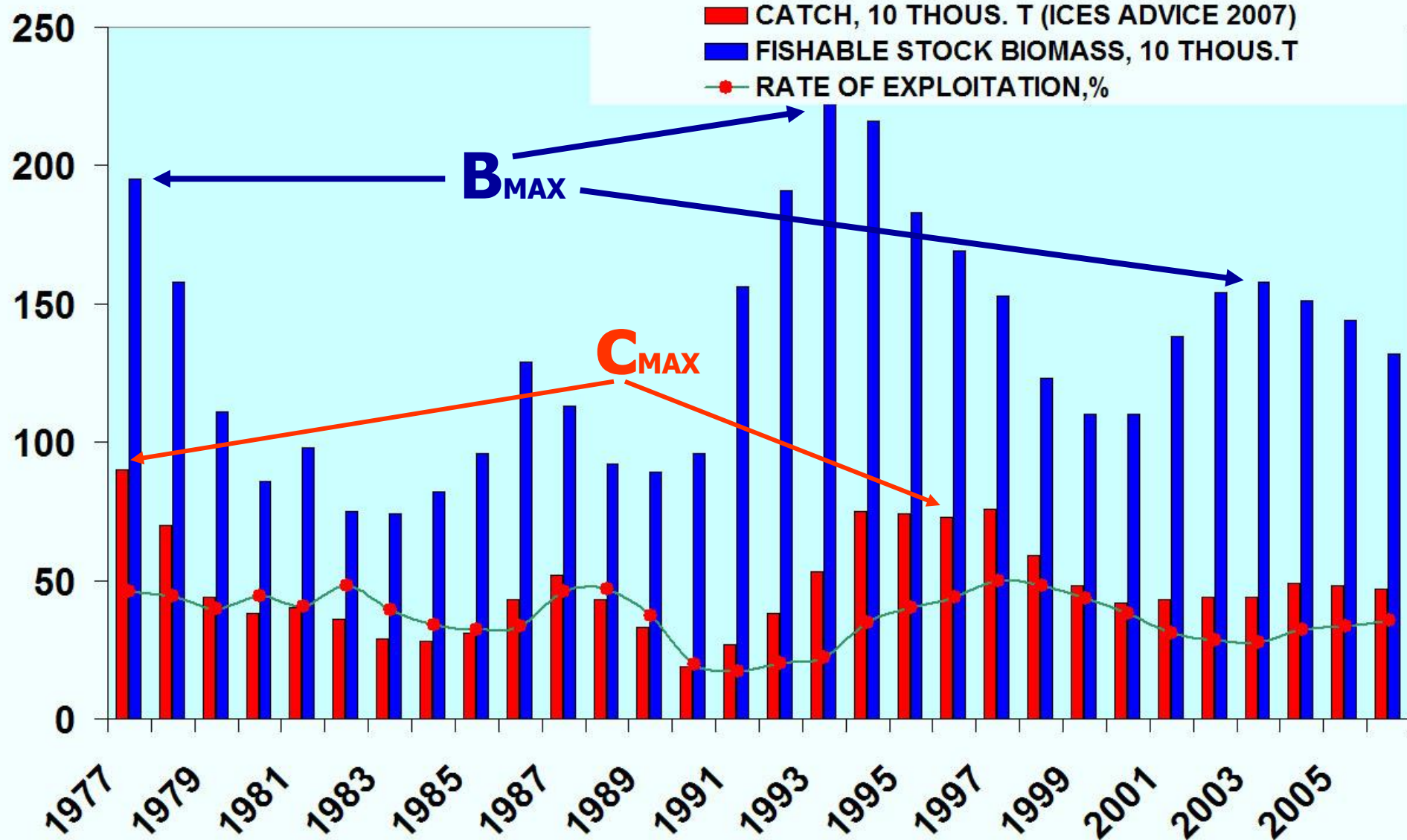
RELATIVE CATCH DYNAMICS (RUSSIAN FLEET,%)
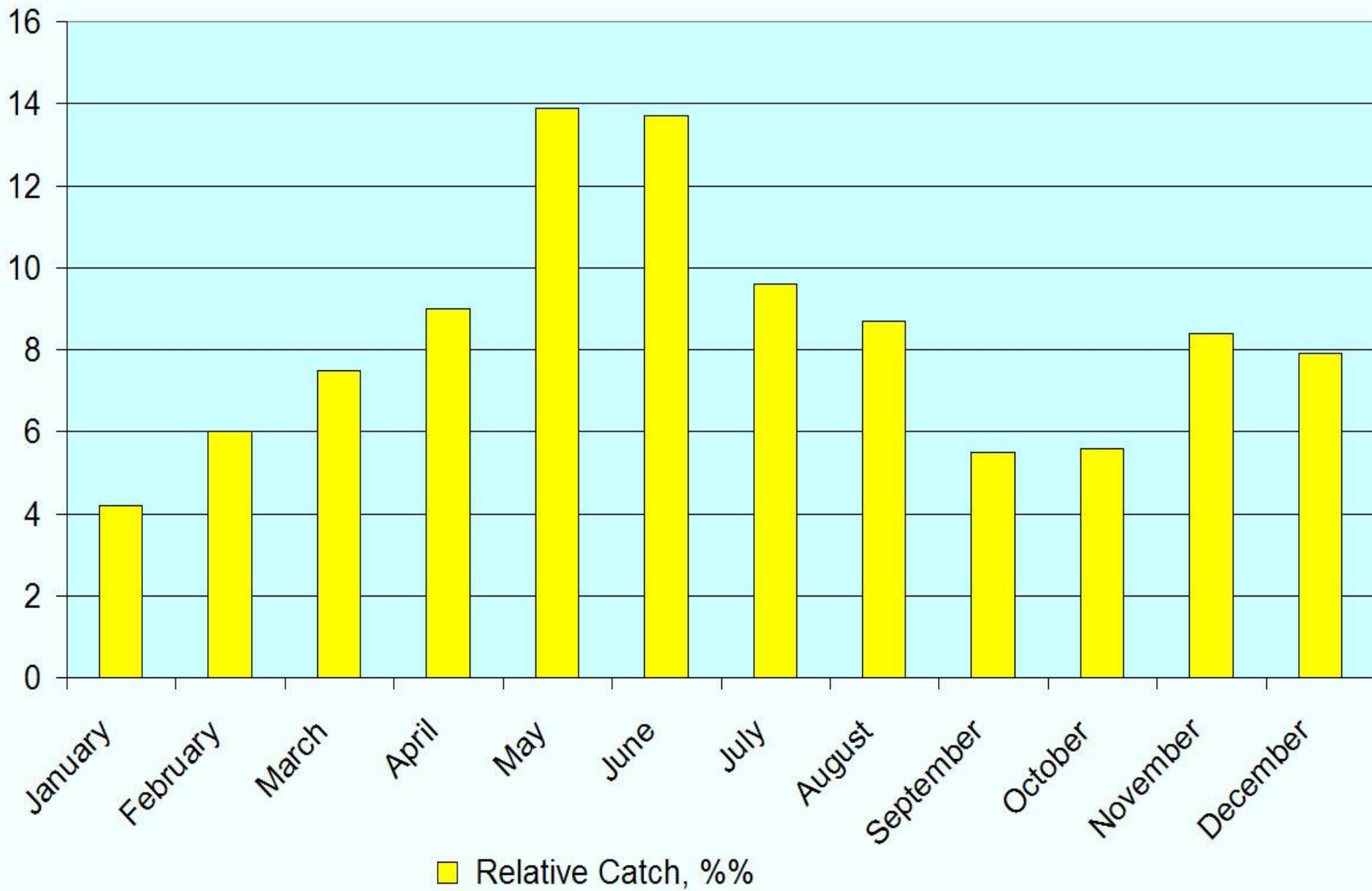
MONTHLY MEAN AND AVERAGE FISHABLE BIOMASS OF ARCTIC COD IN APRIL-DECEMBER 2000-2006
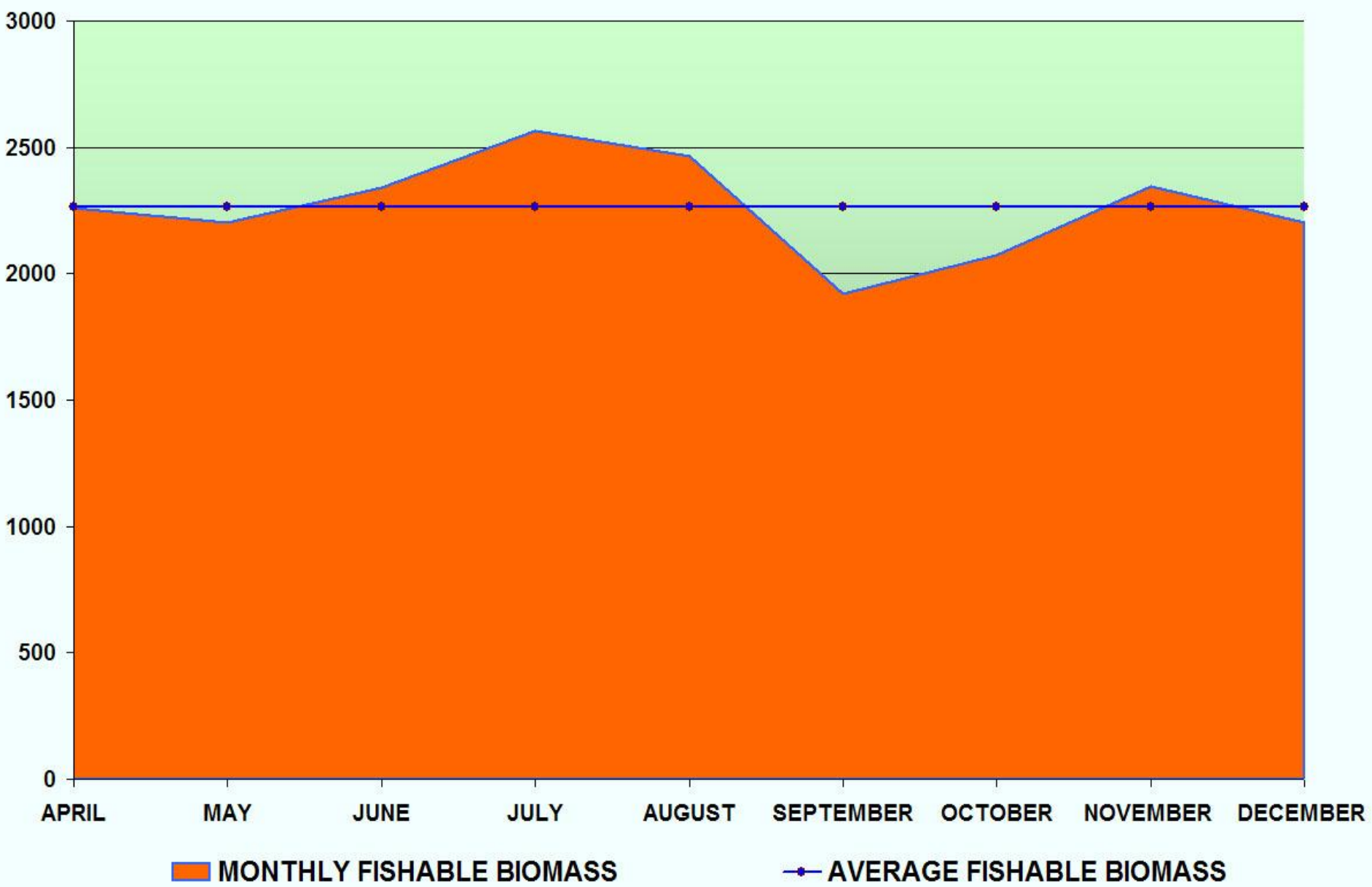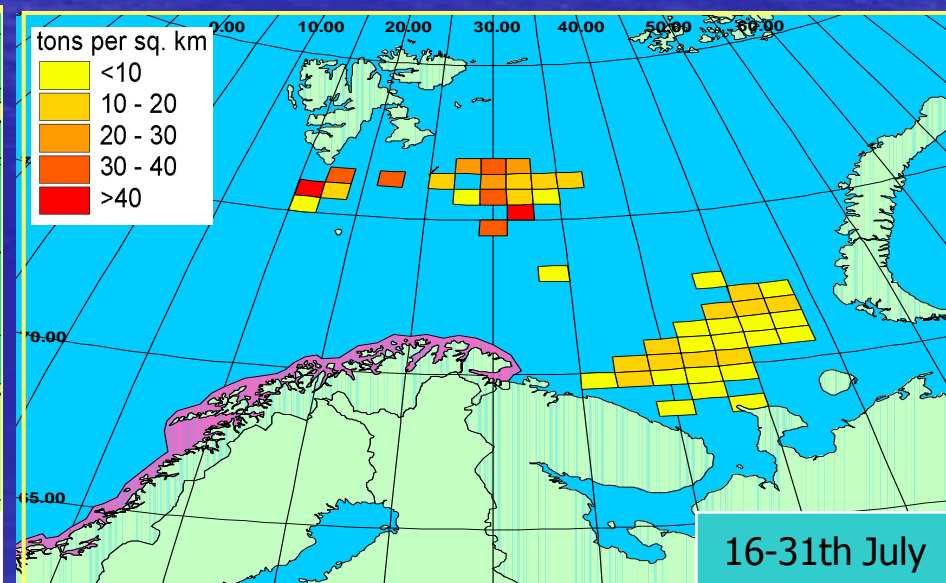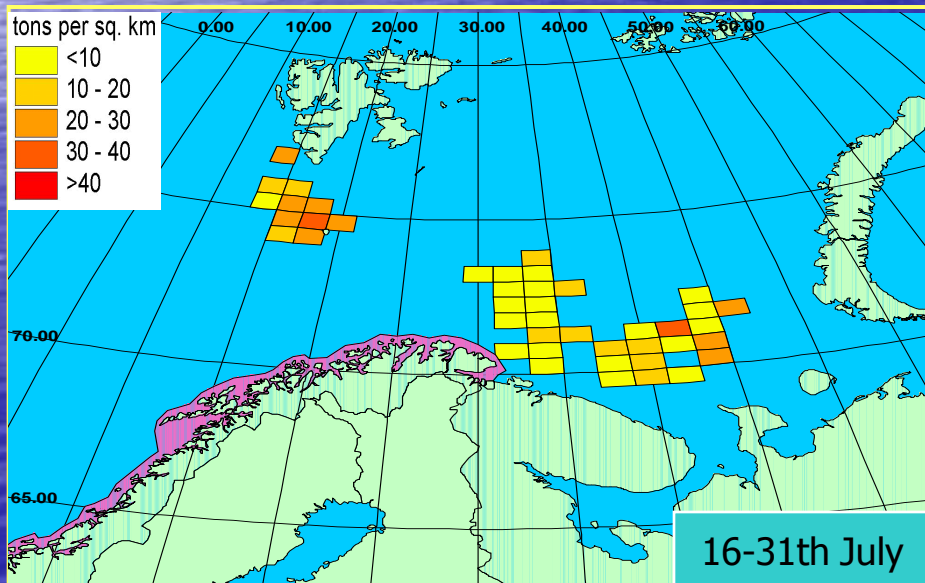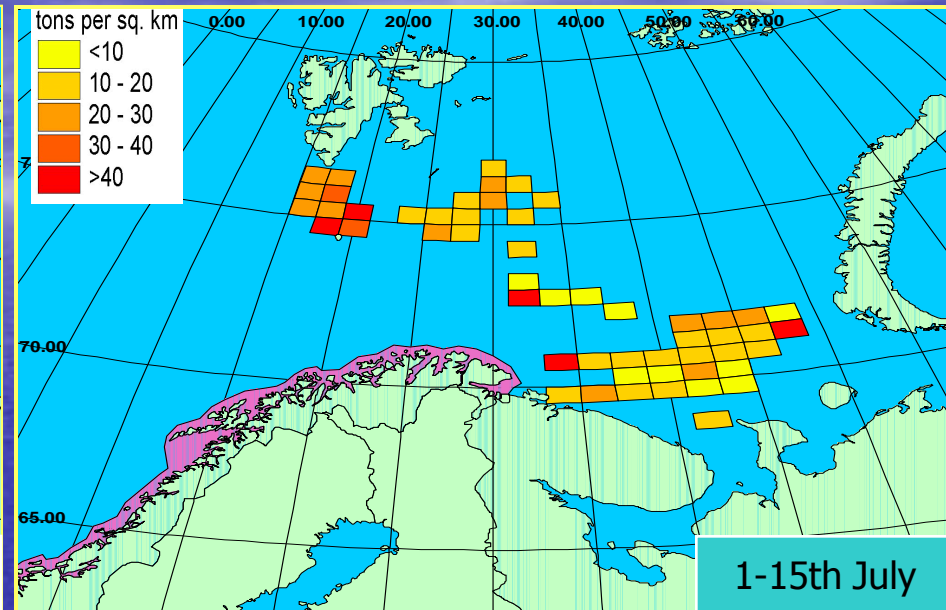
DENSITY DISTRIBUTION OF ARCTIC COD CATCHES IN
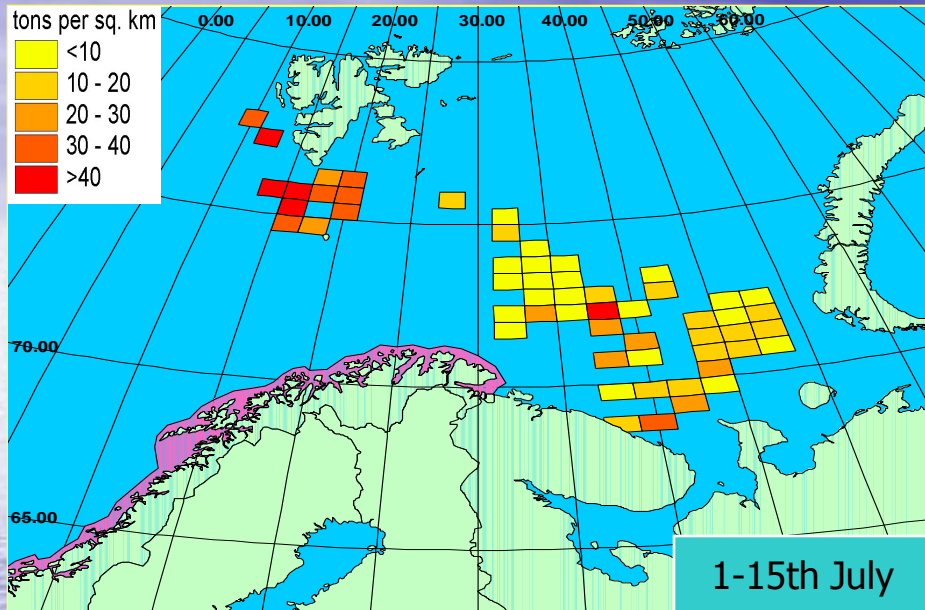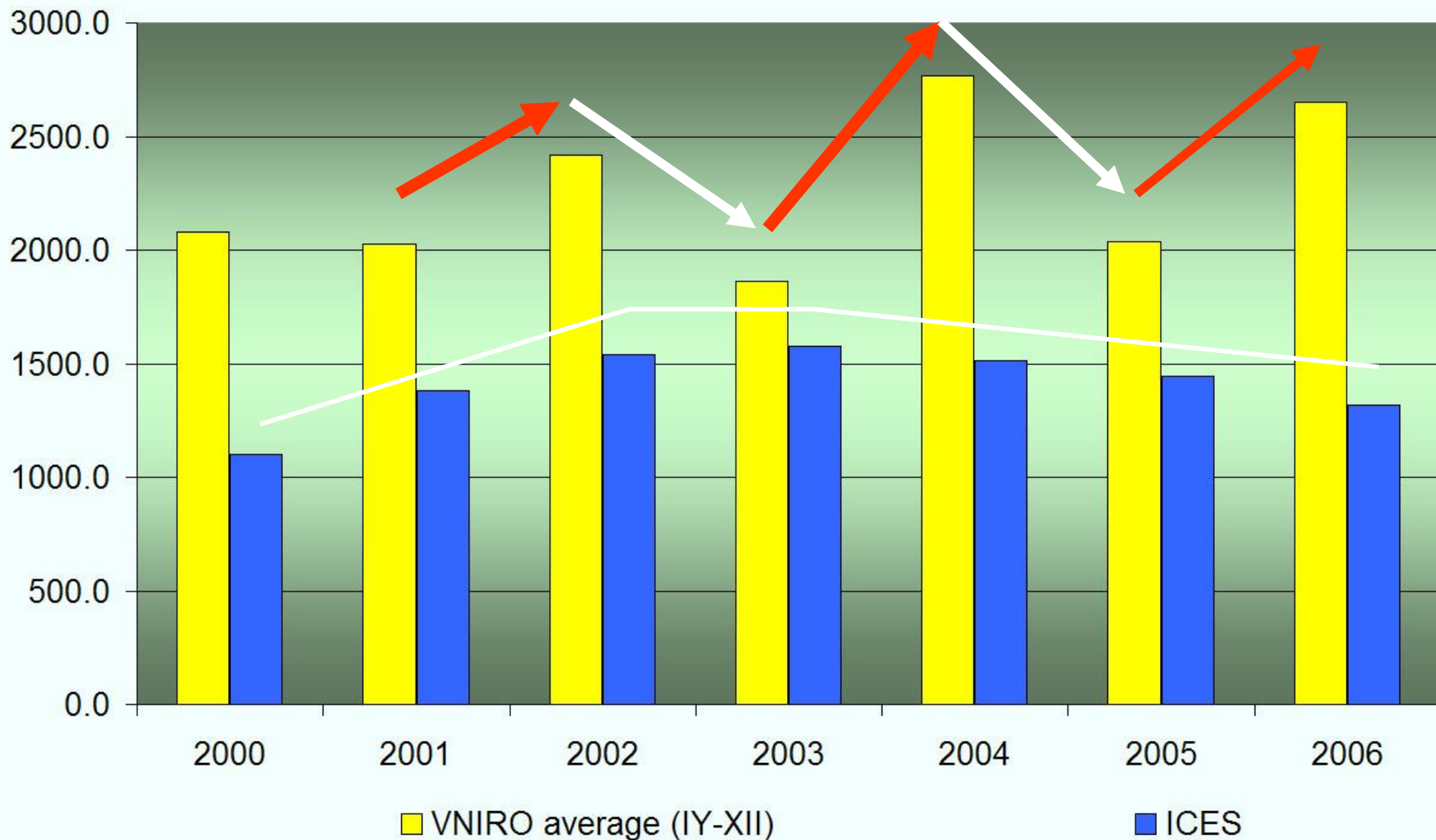## 2002   2004
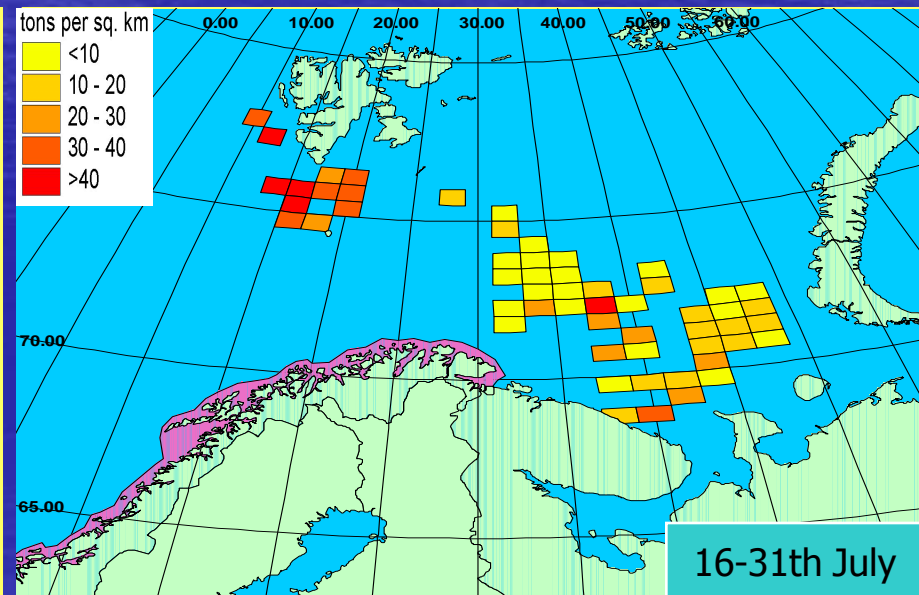
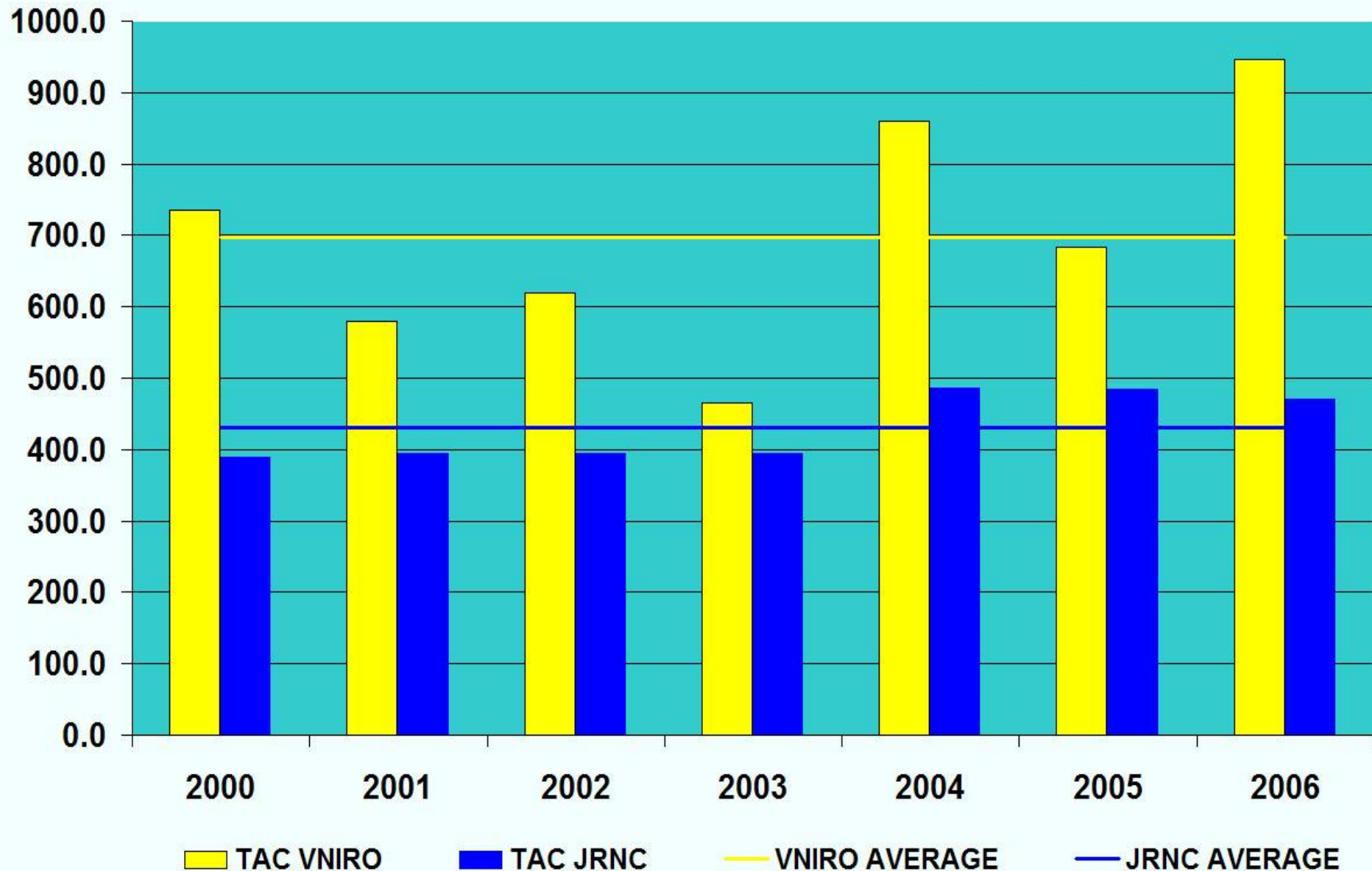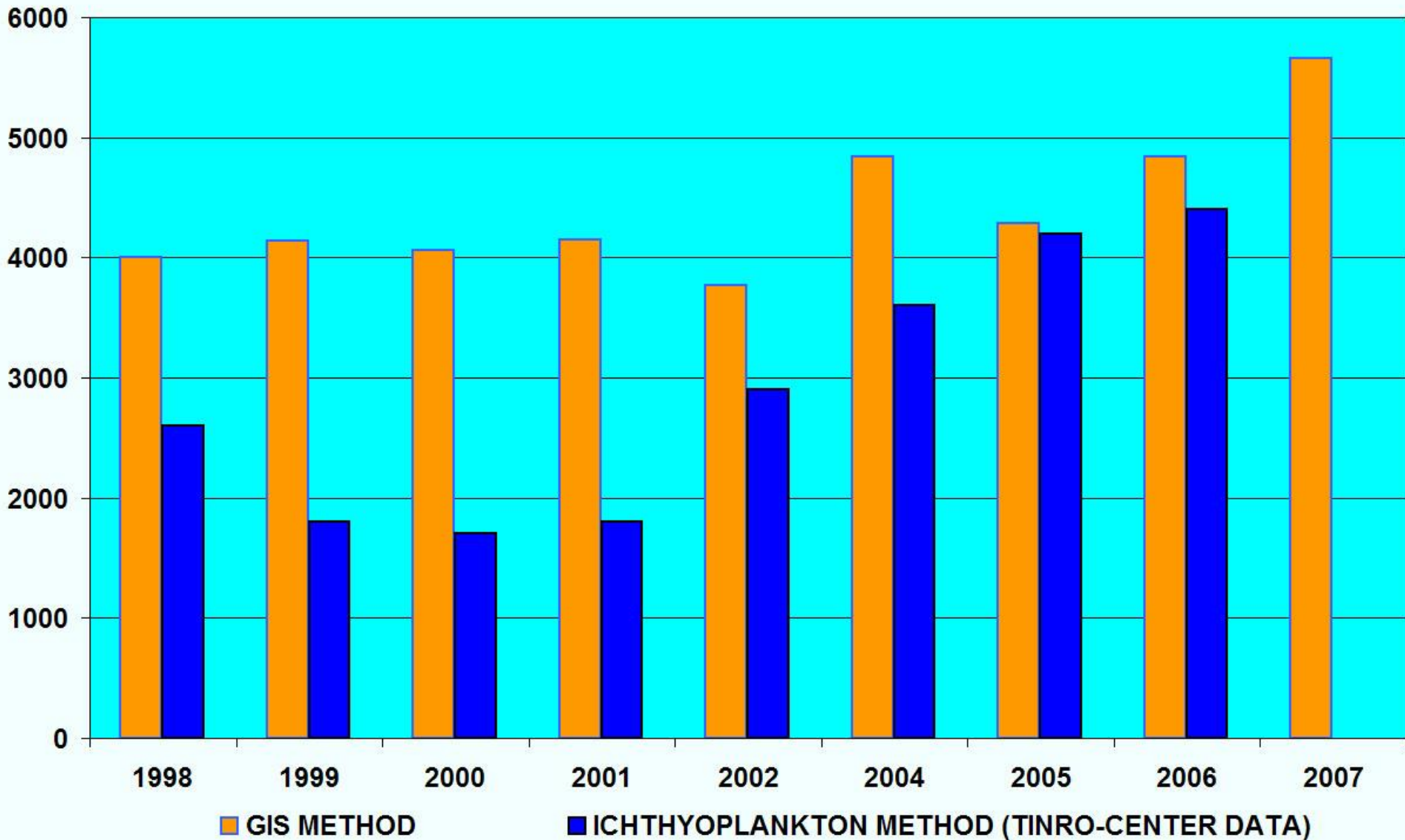# DENSITY DISTRIBUTION OF ARCTIC COD CATCHES IN 2005 2006

ASSESSMENT OF THE FISHABLE STOCK OF ARCTIC COD BY GIS AND XSA METHODS (thousands ton)
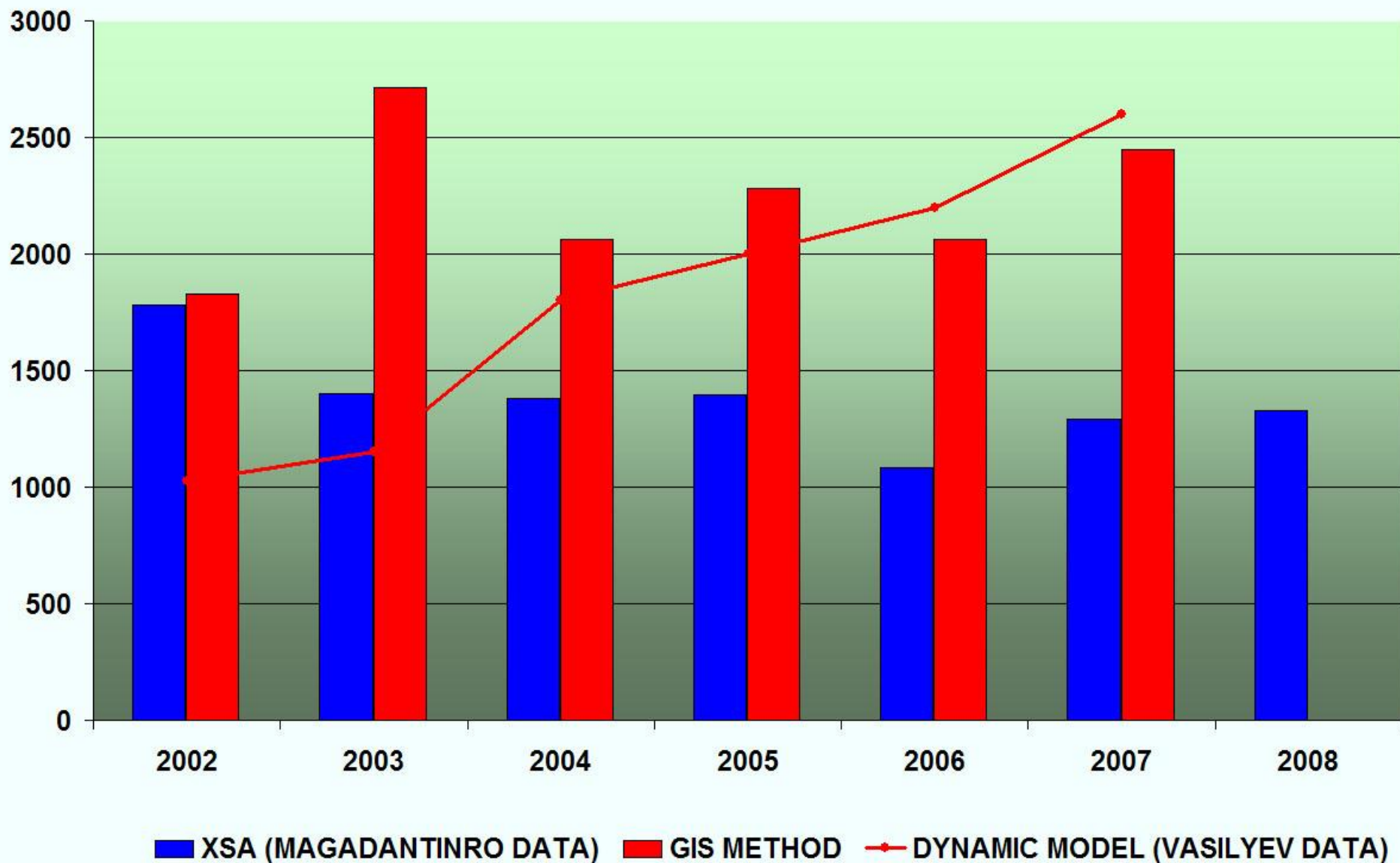
ASSESSMENT OF TOTAL ALLOWABLE CATCH
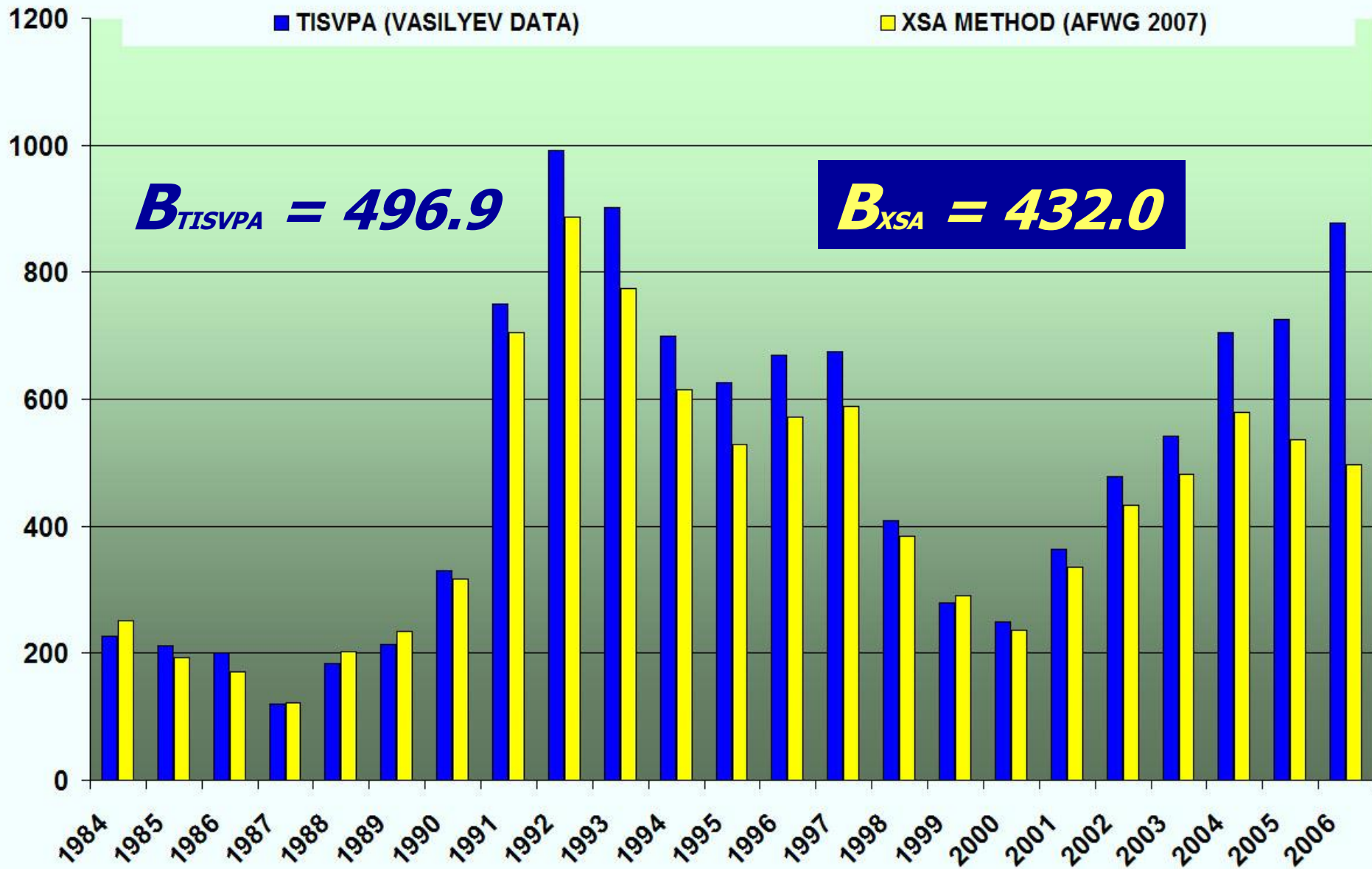OF ARCTIC COD, thousands ton

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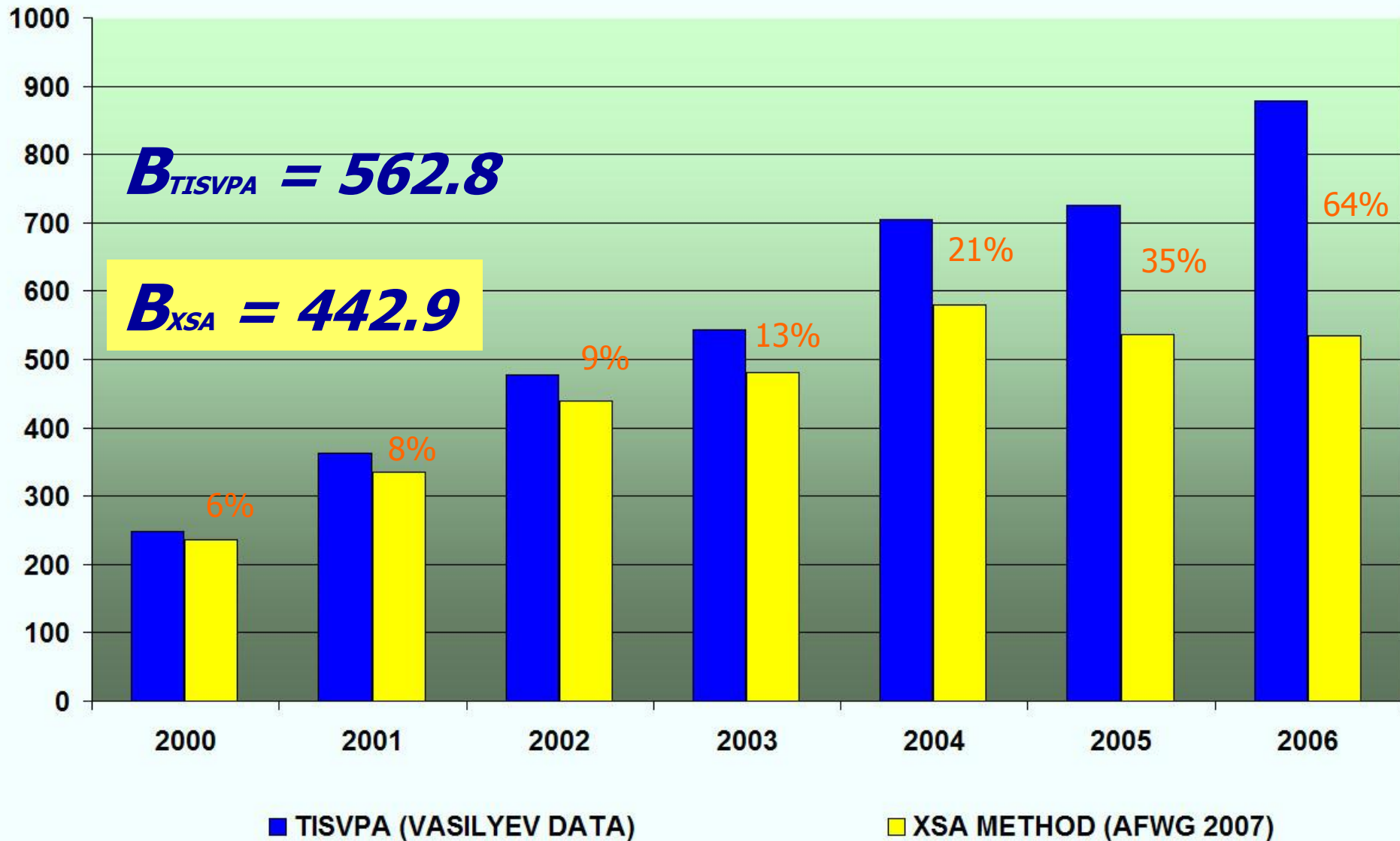
ASSESSMENT OF FISHABLE BIOMASS
OF WALLEYE POLLOCK IN THE NORTH OF OKHOTSK SEA
BY DIFFERENT METHODS (thousands ton)

ASSESSMENT OF SPAWNING BIOMASS OF ARCTIC COD BY TISVPA AND XSA METHODS
(thousands ton)

ASSESSMENT OF SPAWNING BIOMASS OF ARCTIC COD BY TISVPA AND XSA METHODS IN 2000-2006 (thousands ton)

Conclusions

- The seasonal stock dynamics is characterized by two maxima: in July and November

- The fishable biomass of cod in 2000-2006 was at a stable level and according to the VNIRO estimations exceeded 2,3 mln t.

- Basing on the "new" cod biomass estimated by GIS method in 2000-2006 and the actual rate of exploitation used by JRNC, the TAC can reach 700,000 t, at average.

THANK YOU

FOR YOUR

ATTENTION