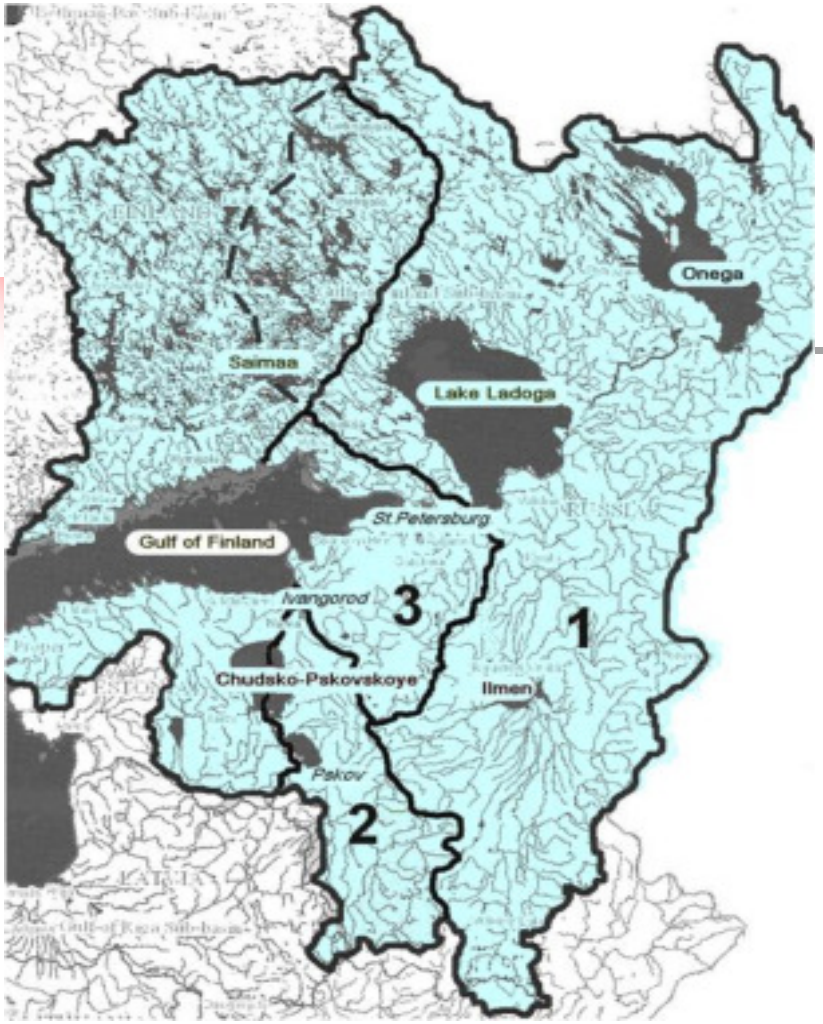
Possibilities for calculation of nutrient load reduction for the implementation of the HELCOM Baltic Sea Action Plan

Kondratyev Sergey

BSD - 2017



HELCOM

HELCOM Copenhagen Ministerial Declaration

Taking Further Action to Implement the Baltic Sea Action Plan
- Reaching Good Environmental Status
for a healthy Baltic Sea

3 October 2013, Copenhagen, Denmark

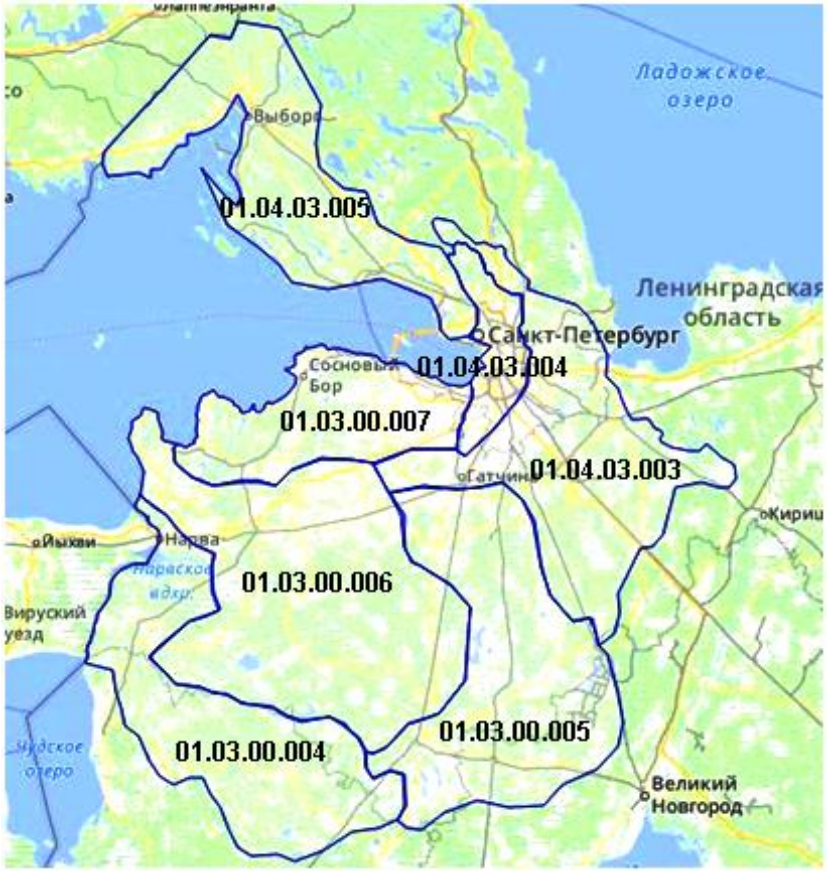
Specific Load from Russian part of the GoF catchment (t/km^{2}y)

	P_{tot}	N_{tot}
Specific Load in 2012-2013	9.3	203.1
Maximum allowable specific load (BSAP, 2007)	11.5	253.4
Maximum allowable specific load (Copenhagen Declaration, 2013):	8.5	241.3

HELCOM

Baltic Marine Environment Protection Commission

The purpose of this work is distribution of the BSAP recommended reduction of the nutrient load between different parts of the Russian catchment area of the Gulf of Finland



The water management scheme of dividing Russian part of the catchment area on the water management districts – WMD

Stages of the study

- Assessment of the present level of nutrient load on the GoF from Russian catchment;
- Calculation of the required load reduction for Russia (using Copenhagen Ministerial Declaration, 2013);
- Assessment of the potential load reduction from the point and diffuse sources for each WMD;
- Distribution of the recommended load reduction for WMD's proportionally to the potential load reduction.

Assessment of the nutrient load on the Gulf of Finland from the Russian territory in 2012–2013

Source	**P_{tot}, t/y**	**N_{tot}, t/y**
Lake Ladoga	951	34747
St. Petersburg	442	9483
River immediate catchment	790	3830
River Narva	217	5703
River Luga	331	4252
Small tributaries of the		
- monitored territory	133	2880
- unmonitored territory (modeled)	152	1890
- direct discharges	78	269
Total	**3094**	**63 054**

Required load reduction (Δ) for Russia (after Copenhagen Ministerial Declaration, 2013)

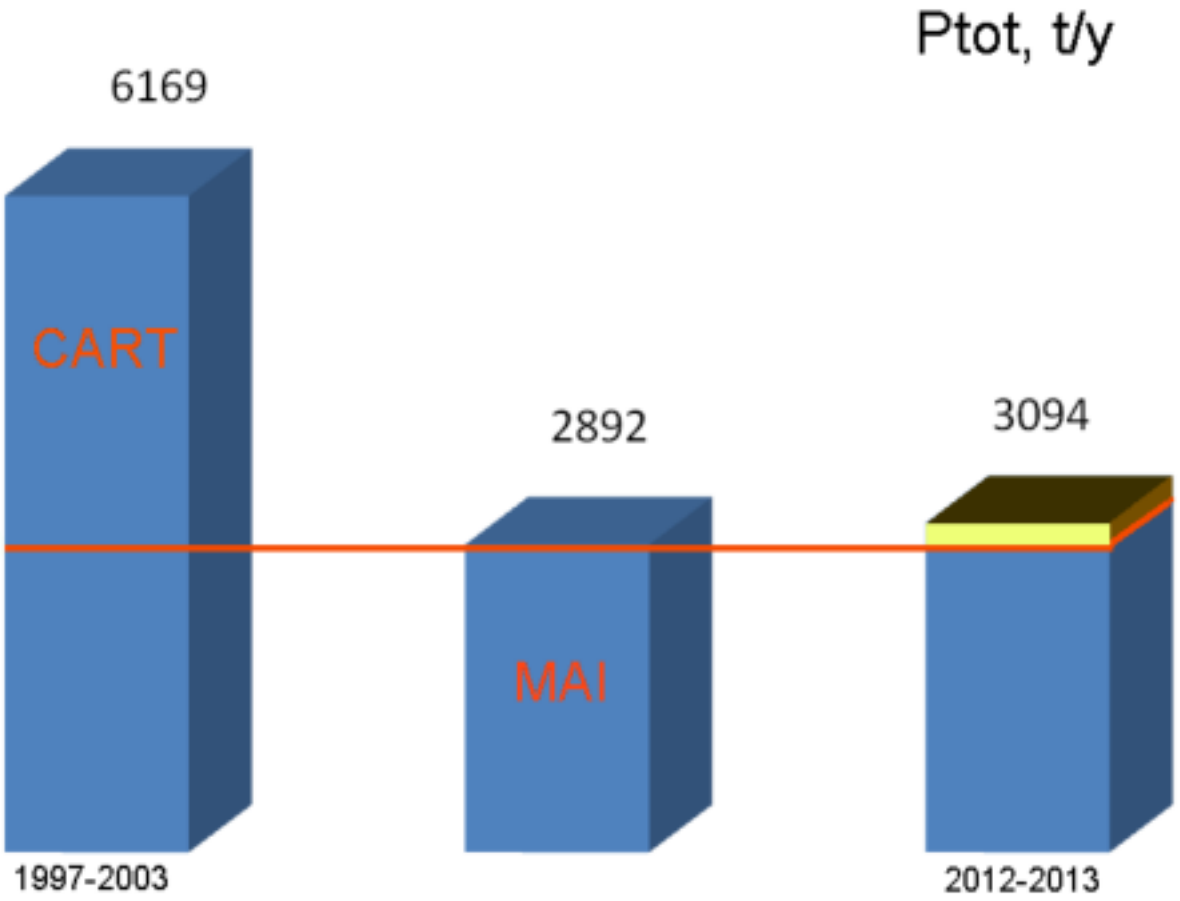
	P_{tot}, t/y	N_{tot}, t/y
1997-2003 Load on the GoF	6169	68653
Country Allocated Reduction Targets	3277	7683
Maximum Allowable Inputs from Russia	2892	60 970
2012-2013 Load on the GoF	3094	63 054
Required load reduction (Δ)	202	2084

•HELCOM Copenhagen Ministerial Declaration: Taking Further Action to Implement the Baltic Sea Action Plan - Reaching Good Environmental Status for a healthy Baltic Sea - Copenhagen, Denmark, 2013 a, 19p.

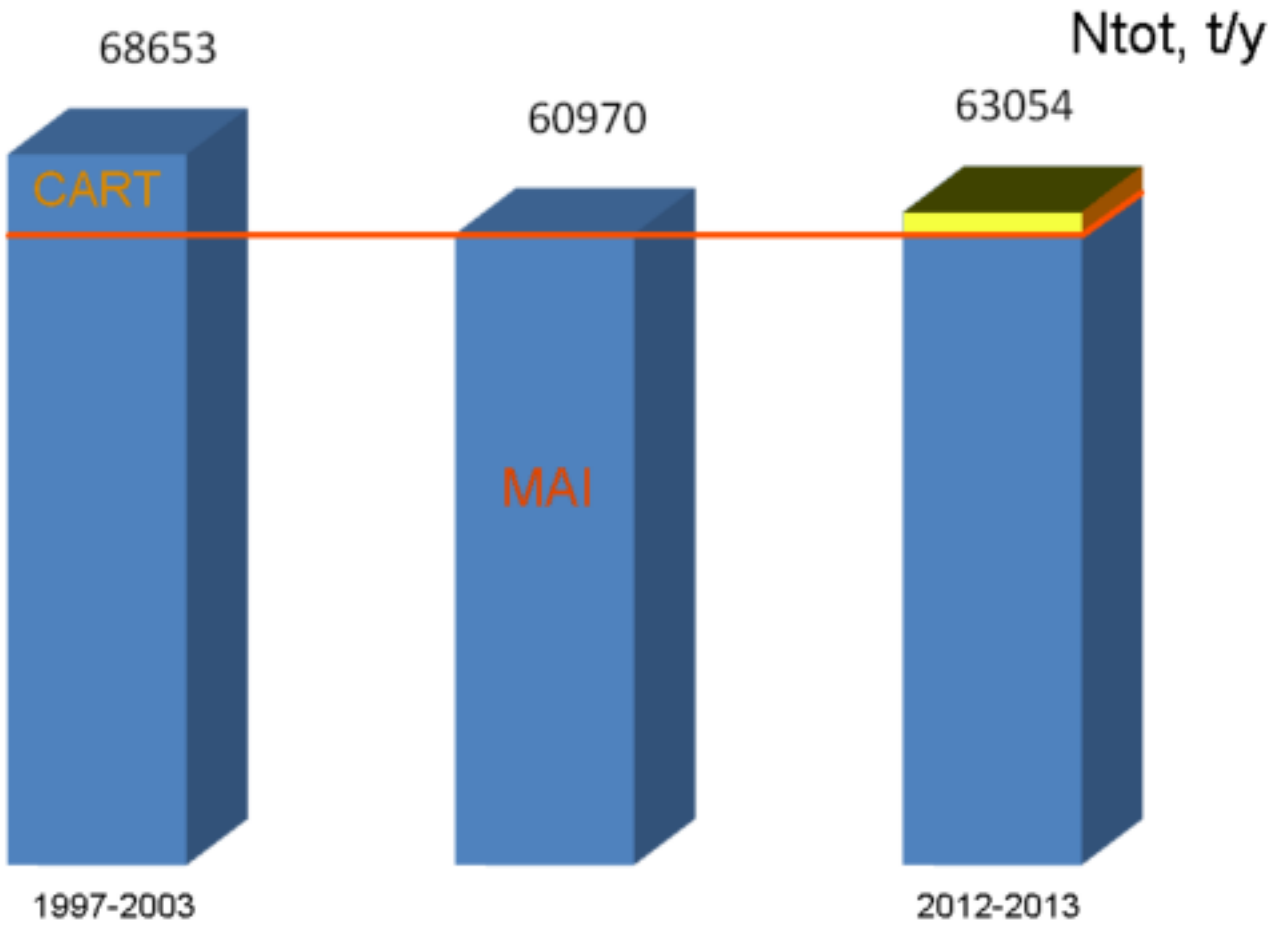
•HELCOM Summary report on the development of revised Maximum Allowable Inputs (MAI) and updated Country Allocated Reduction Targets (CART) of the Baltic Sea Action Plan - Baltic Marine Environment Protection Commission, Helsinki, 2013 b, 22 p.

•HELCOM Updated Fifth Baltic Sea Pollution Load Compilation (PLC-5.5) - Baltic Sea Environment Proceedings No. 145, 2015, 142 p.

Phosphorus load on the GoF from Russian catchment



Nitrogen load on the GoF from Russian catchment



Assessment of the potential load reduction (as a sum of point and diffuse sources impacts)

WMD	Potential of P load reduction, t/y	Potential of N load reduction, t/y
01.03.00.004	3.0	117.0
01.03.00.005	26.6	288.0
01.03.00.006	23.3	192.0
01.03.00.007	5.0	173.0
01.04.03.003	68.8	1362.0
01.04.03.004	22.8	1469.0
01.04.03.005	36.7	160.0
Sum	186.2	3761.0

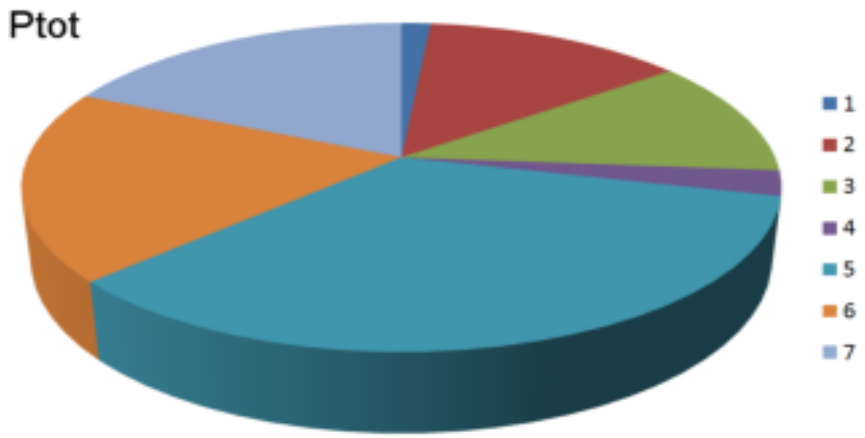
Distribution of the recommended load reduction for WMD's proportionally to the potential load reduction

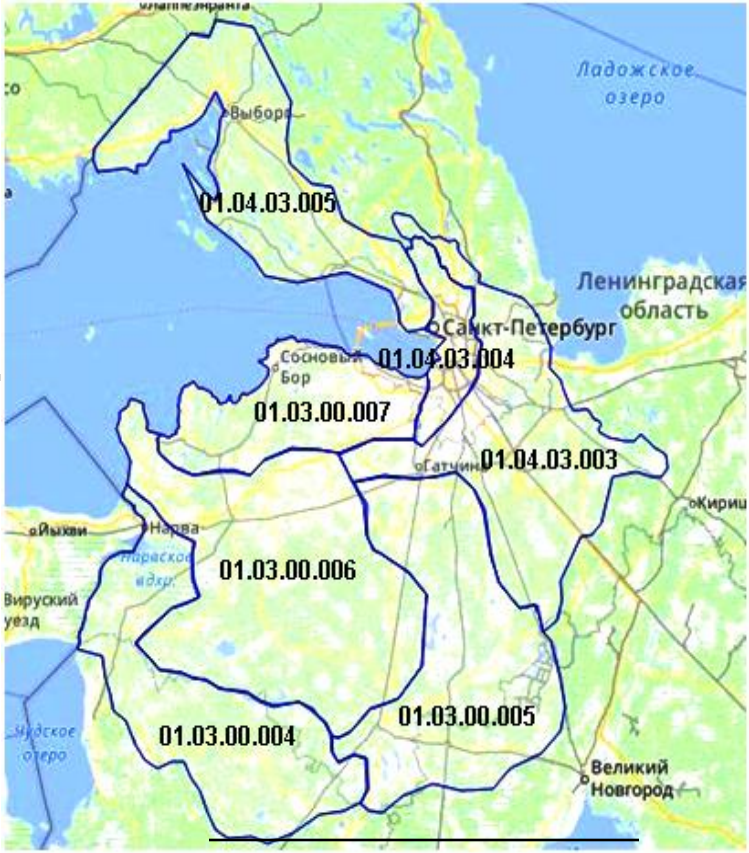
$$\Delta_k = \Delta \; p_k \Big/ \sum_{i=1}^{n} p_i ,$$

Δ - total reduction for Russian catchment,
Δ_k - reduction for WMD_k,
p_k – potential load reduction for WMD_k,
n=7 (number of WMDs)

WMD	Potential of P load reduction, t/y	Potential of N load reduction, t/y	$P_{tot}\,\Delta_k$, t/y	$N_{tot}\,\Delta_k$, t/y
01.03.00.004	3.0	117.0	3.0	51.4
01.03.00.005	26.6	288.0	26.7	126.6
01.03.00.006	23.3	192.0	23.4	84.4
01.03.00.007	5.0	173.0	5.0	76.1
01.04.03.003	68.8	1362.0	69.1	598.8
01.04.03.004	22.8	1469.0	38.0	1076.4
01.04.03.005	36.7	160.0	36.8	70.3
Sum	186.2	3761.0	202.0	2084.0

Distribution of the required load reduction





WMD
1 - 01.03.00.004
2 - 01.03.00.005
3 - 01.03.00.006
4 - 01.03.00.007
5 - 01.04.03.003
6 - 01.04.03.004
7 - 01.04.03.005

Results of the study was published in:

Поздняков Ш.Р., Кондратьев С.А., Тарбаева В.М., Шмакова М.В., Брюханов А.Ю., Воробьёва Е.А., Обломкова Н.С. Научное обоснование выполнения рекомендаций ХЕЛКОМ по снижению биогенной нагрузки на Финский залив со стороны России - Вестник СПбГУ. Сер. 7. Геология. География. 2016, №4, с. 53-65.

Sh.R.Pozdnyakov, S.A.Kondratyev, V.M. Tarbaeva, M.V. Shmakova, A.Yu.Brukhanov, E.A. Vorob'eva, N.S.Oblomkova A scientific substantiation of the recommendations of HELCOM to reduce the nutrient load on the Gulf of Finland from Russia – Herald of St.Petersburg State University/ Geology & Geography, 2016, №4, pp. 53-65

Coefficient of P_{tot} retention

Lake Onega	0.76
Lake Ladoga	0.70
Lake Ilmen	0.53
Lake Chudskoe/Peipsi	0.56
Kurshskaya Lagoon	0.49
Vistula Lagoon	0.31

Thank you