Long-term trends of nitrogen and phosphorus inputs since 1995

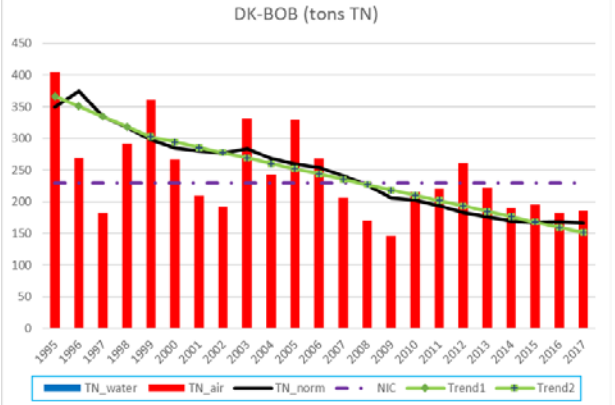
Figure 1A and 1B illustrate time series 1995-2017 for total nitrogen (1A) and phosphorus (1B) actual and normalized inputs country per Baltic Sea sub-basin, trends in total inputs and nutrient input ceiling. Atmospheric phosphorus inputs are not included in the assessment as input sources could not be allocated, and it is considered as constant background input that cannot be managed.

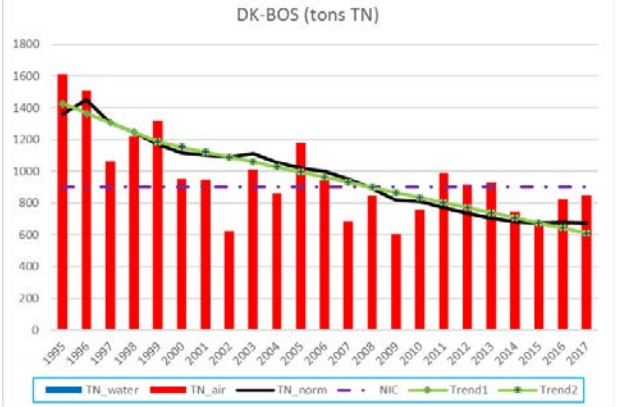
Table 1A and 1B are overviews of break points in the normalized nutrient input times series.

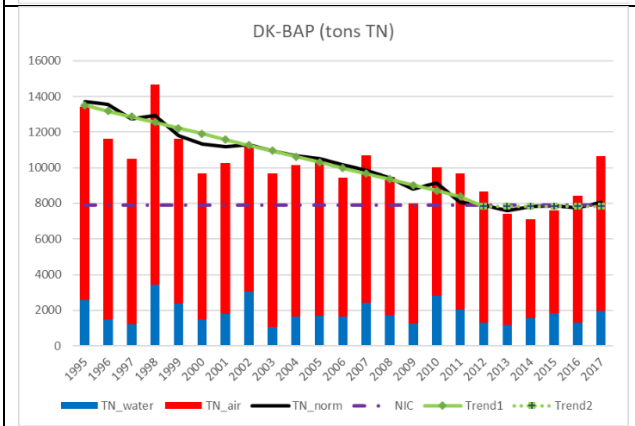
Abbreviation used:

- BOB = Bothnian Bay
- BOS = Bothnian Sea
- BAP = Baltic Proper
- GUF = Gulf of Riga
- GUR = Gulf of Riga
- DS = Danish Straits
- KAT = Kattegat
- BSS = Baltic Sea shipping

- OC = Countries not being HELCOM Contracting Parties and sources outside the catchment area of HELCOM Contracting Parties
- NIC = nutrient input ceilings (og total nitrogen and total phosphorus, respectively)
- TN = total nitrogen
- TP = total phosphorus


DK-BOB (tons TN)
TN_water
TN_air
TN_norm
NIC
Trend1
Trend2


DK-BOS (tons TN)
TN_water
TN_air
TN_norm
NIC
Trend1
Trend2


DK-BAP (tons TN)
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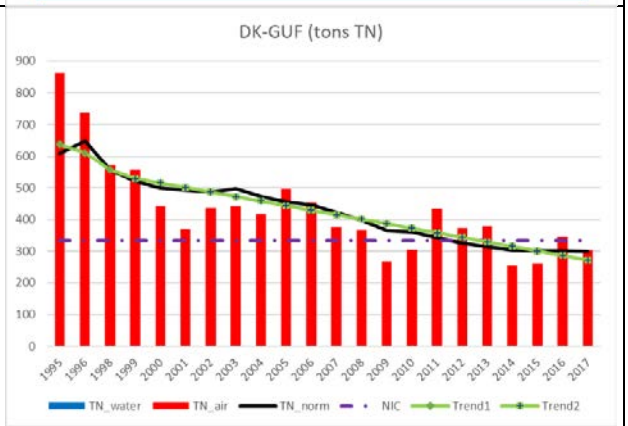
TN_air
TN_norm
NIC
Trend1
Trend2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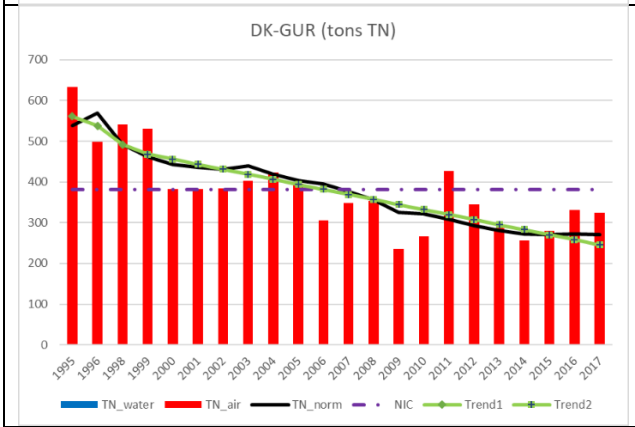
TN_air
TN_norm
NIC
Trend1
Trend2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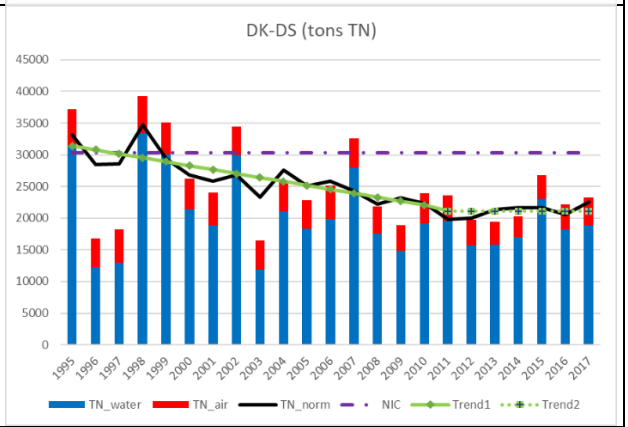
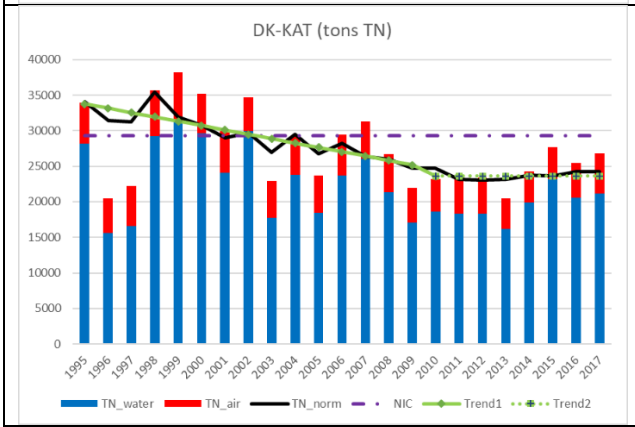
TN_air
TN_norm
NIC
Trend1
Trend2


DK-DS (tons TN)
TN_water
TN_air
TN_norm
NIC
Trend1
Trend2


DK-KAT (tons TN)
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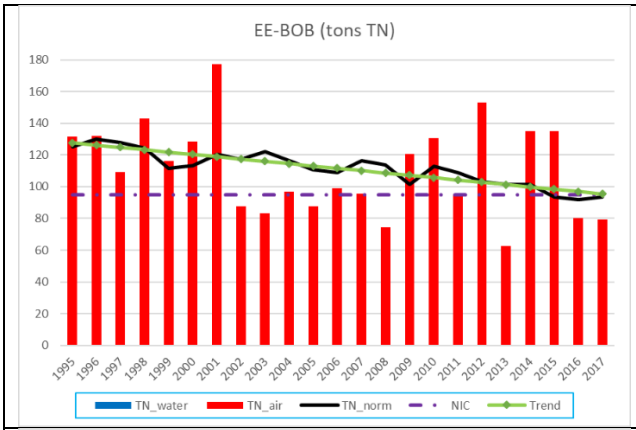
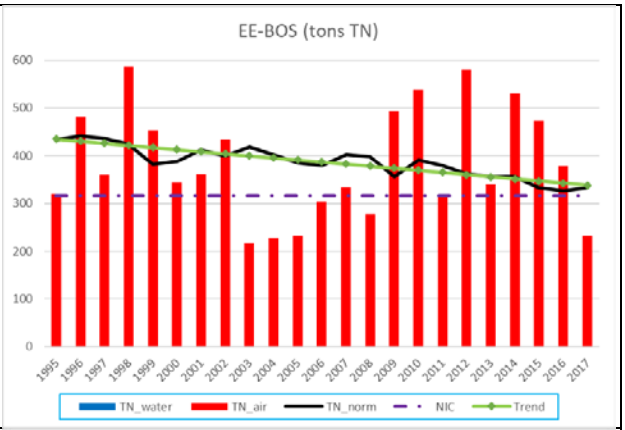
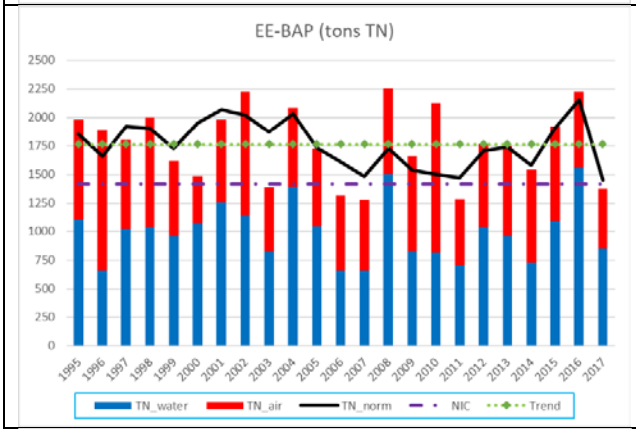
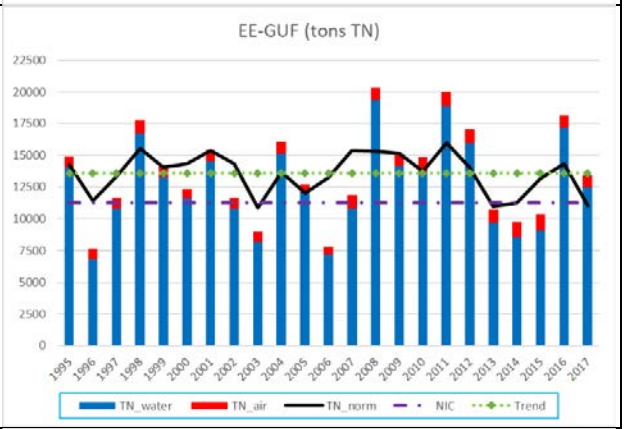
TN_air
TN_norm
NIC
Trend1
Trend2


EE-BOB (tons TN)
TN_water
TN_air
TN_norm
NIC
Trend


EE-BOS (tons TN)
TN_water
TN_air
TN_norm
NIC
Trend


EE-BAP (tons TN)
TN_water
TN_air
TN_norm
NIC
Trend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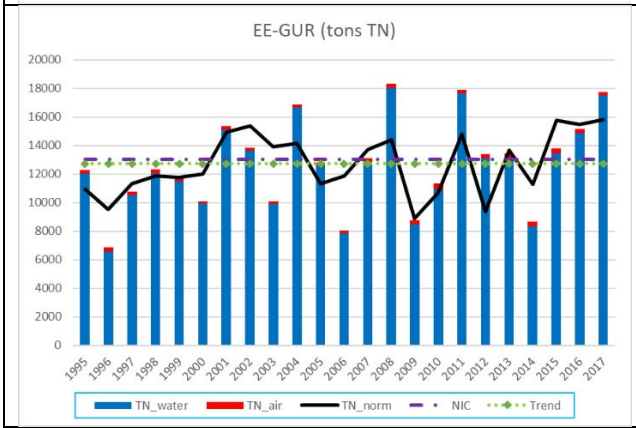
TN_water
TN_air
TN_norm
NIC
Trend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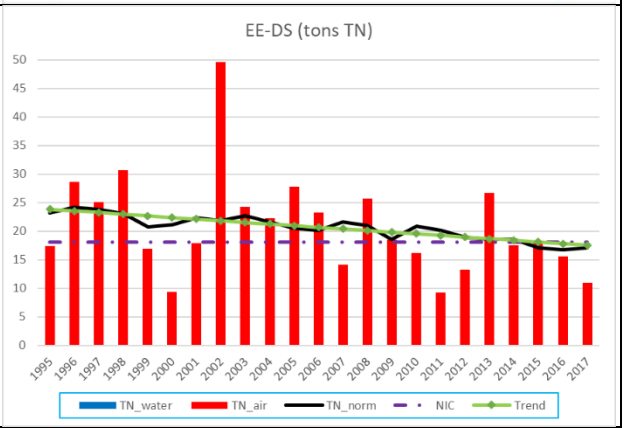
TN_water
TN_air
TN_norm
NIC
Trend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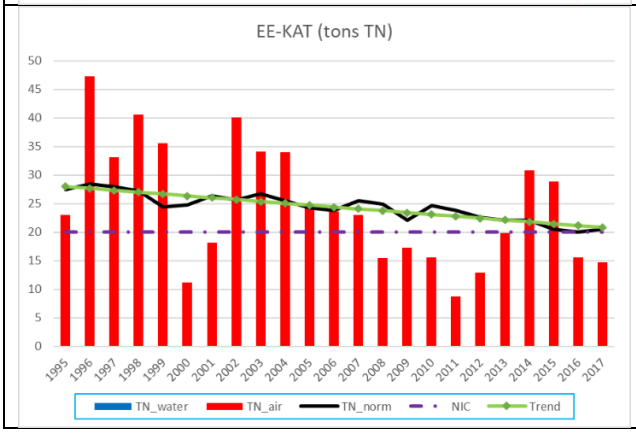
TN_water
TN_air
TN_norm
NIC
Trend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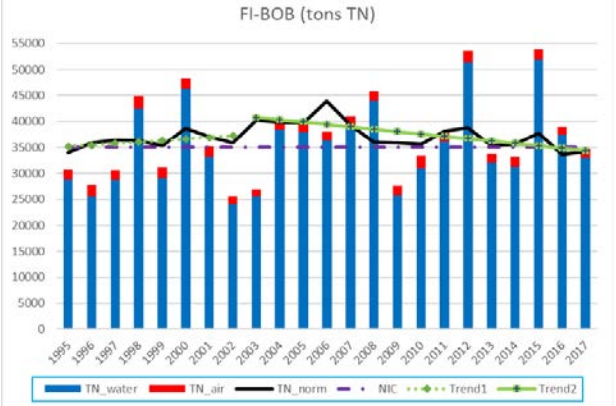
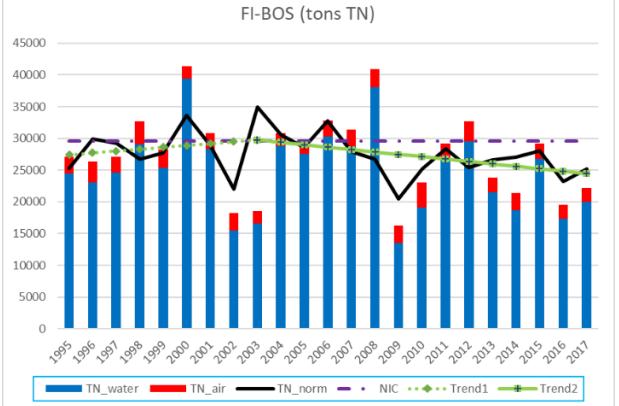
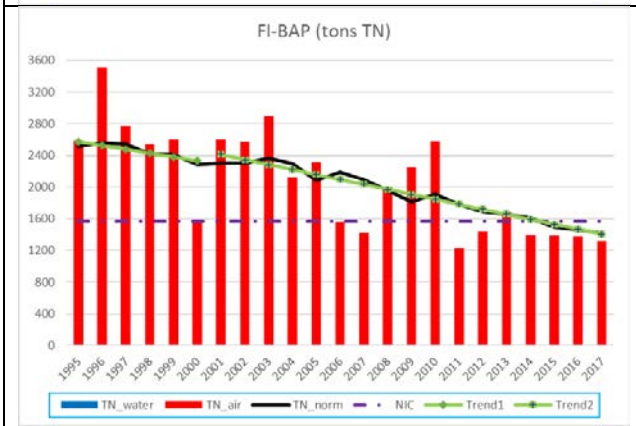
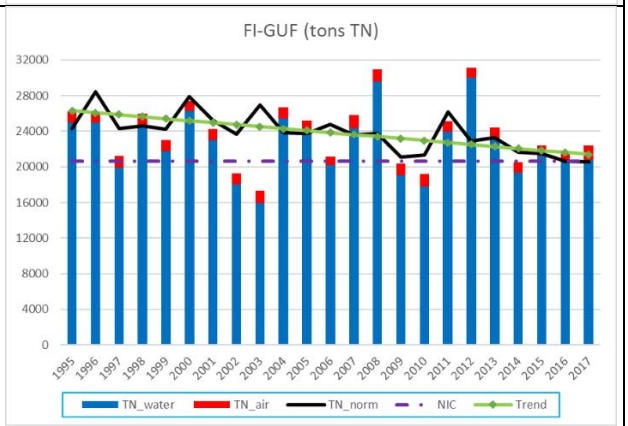
TN_water
TN_air
TN_norm
NIC
Trend


FI-BOB (tons TN)
TN_water
TN_air
TN_norm
NIC
Trend1
Trend2


FI-BOS (tons TN)
TN_water
TN_air
TN_norm
NIC
Trend1
Trend2


FI-BAP (tons TN)
TN_water
TN_air
TN_norm
NIC
Trend1
Trend2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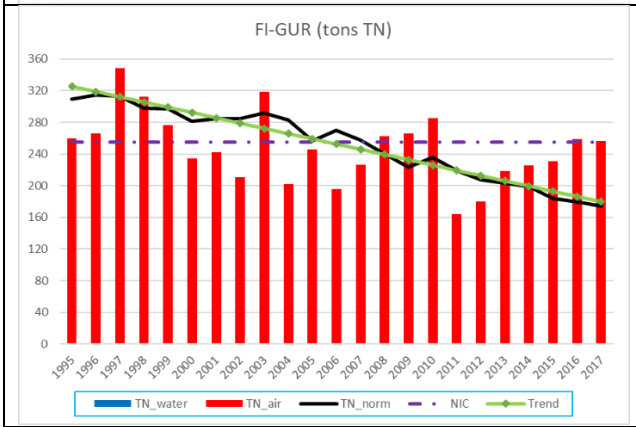
TN_air
TN_norm
NIC
Trend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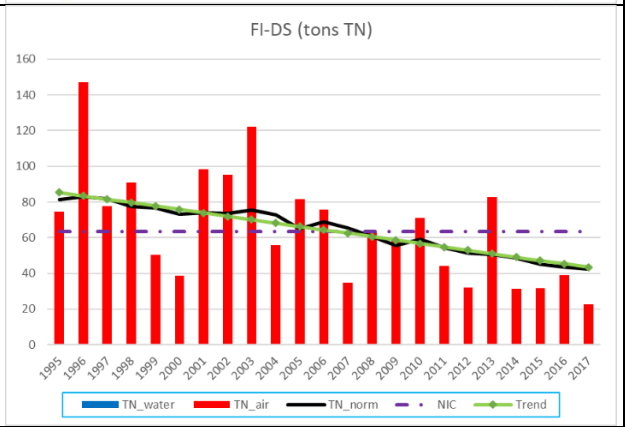
TN_air
TN_norm
NIC
Trend


FI-DS (tons TN)
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TN_air
TN_norm
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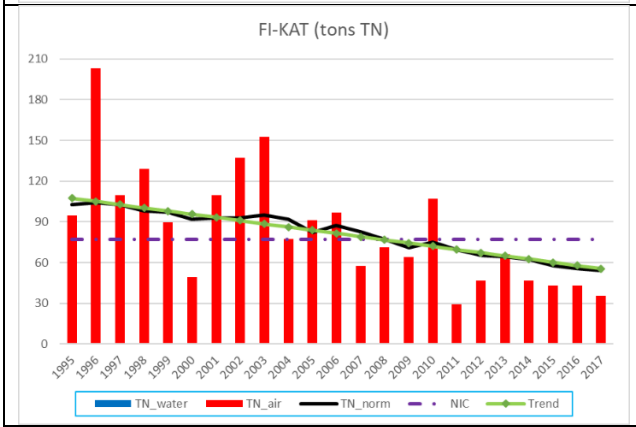
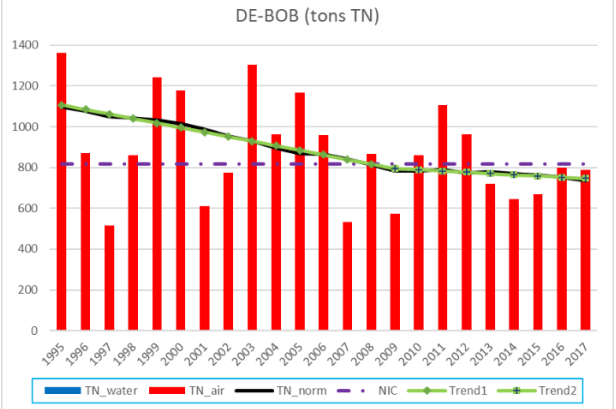
Trend


FI-KAT (tons TN)
TN_water
TN_air
TN_norm
NIC
Trend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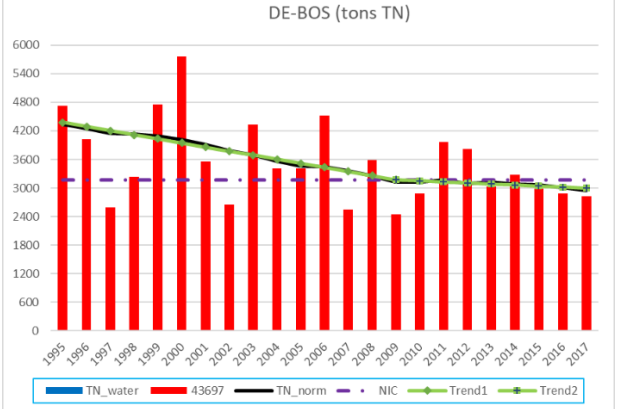
TN_water
TN_air
TN_norm
NIC
Trend1
Trend2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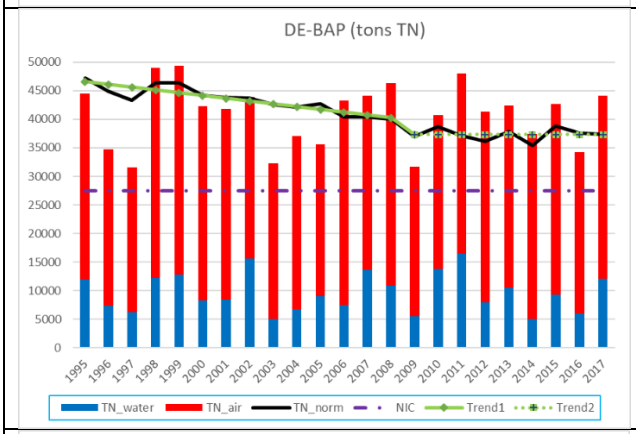
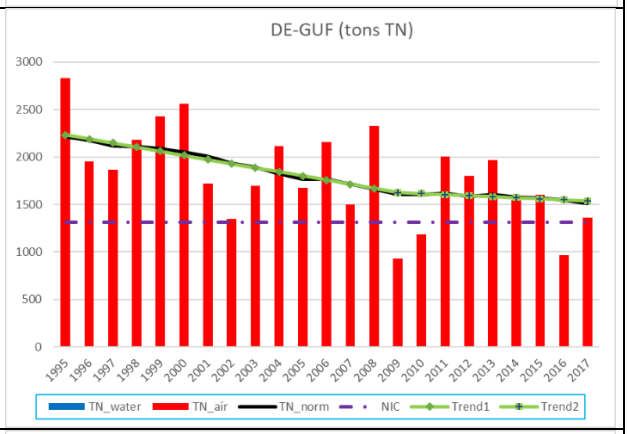
TN_water
43697
TN_norm
NIC
Trend1
Trend2


DE-BAP (tons TN)
TN_water
TN_air
TN_norm
NIC
Trend1
Trend2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TN_water
TN_air
TN_norm
NIC
Trend1
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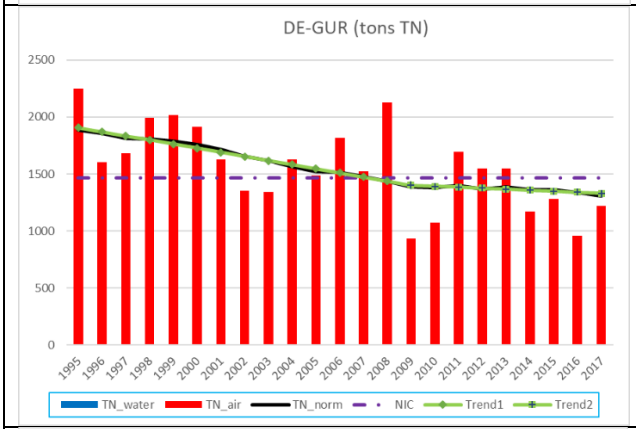
DE-GUR (tons TN)
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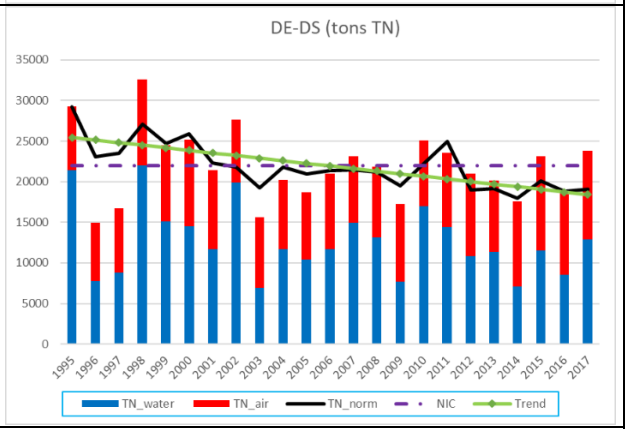
TN_air
TN_norm
NIC
Trend1
Trend2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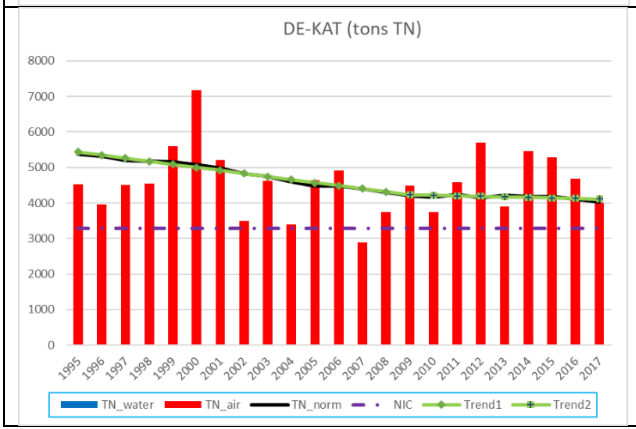
TN_air
TN_norm
NIC
Trend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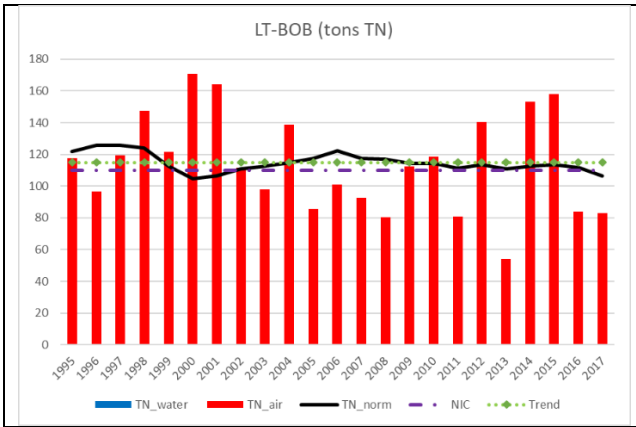
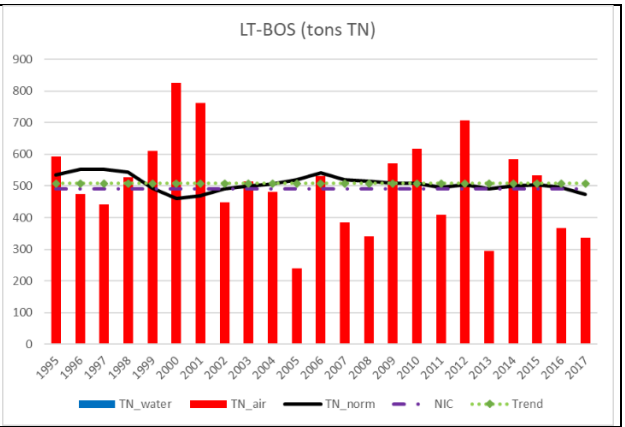
TN_water
TN_air
TN_norm
NIC
Trend1
Trend2


LT-BOB (tons TN)
TN_water
TN_air
TN_norm
NIC
Trend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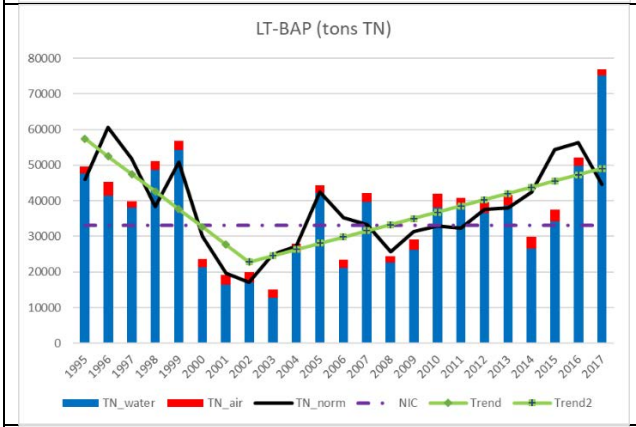
TN_air
TN_norm
NIC
Trend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TN_air
TN_norm
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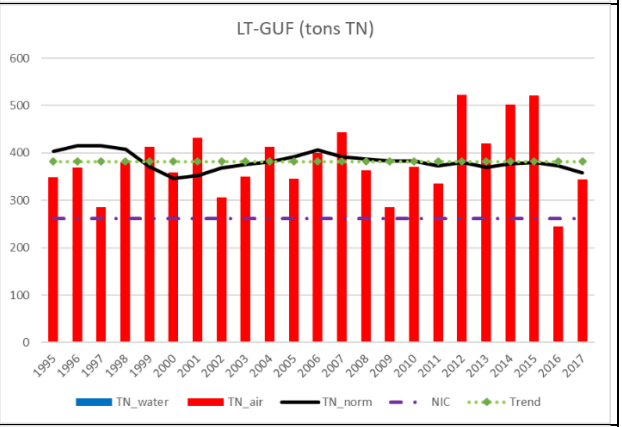
Trend
Trend2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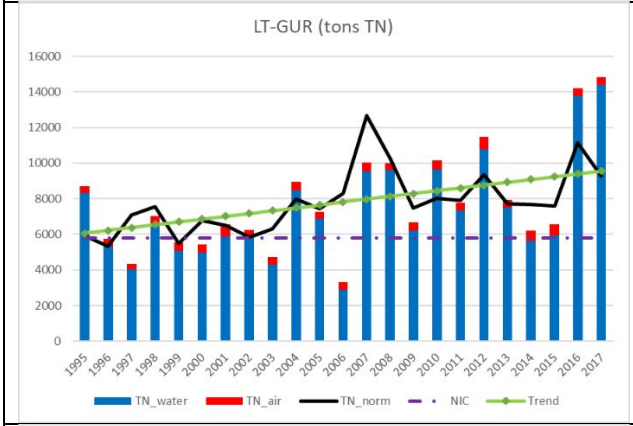
Trend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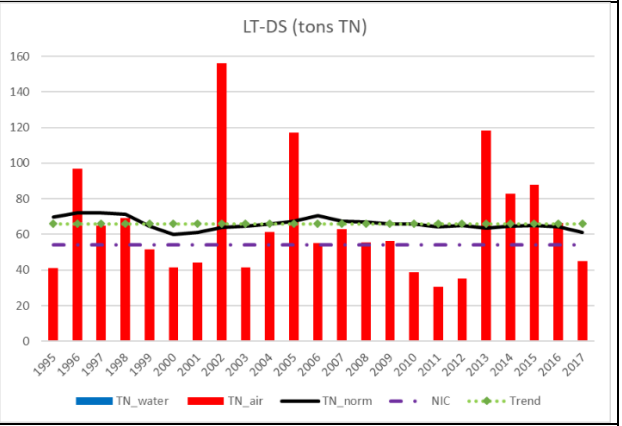
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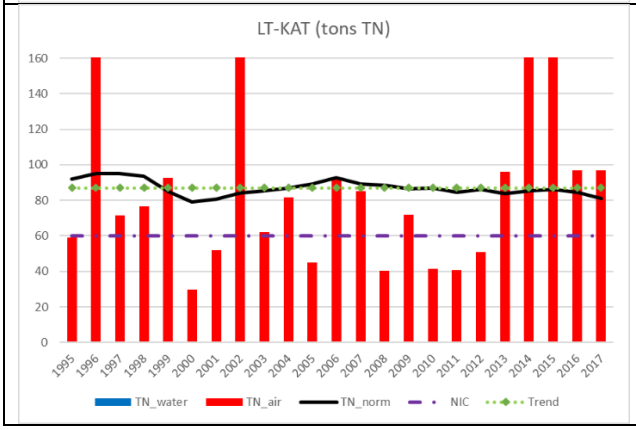
NIC
Trend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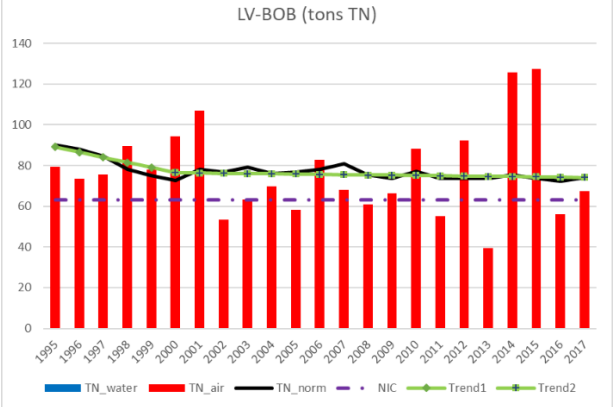
Trend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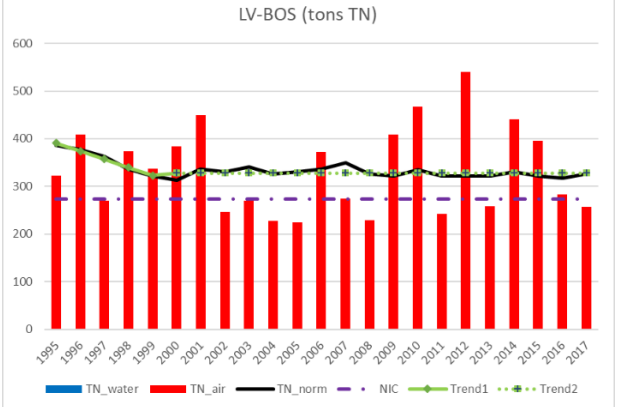
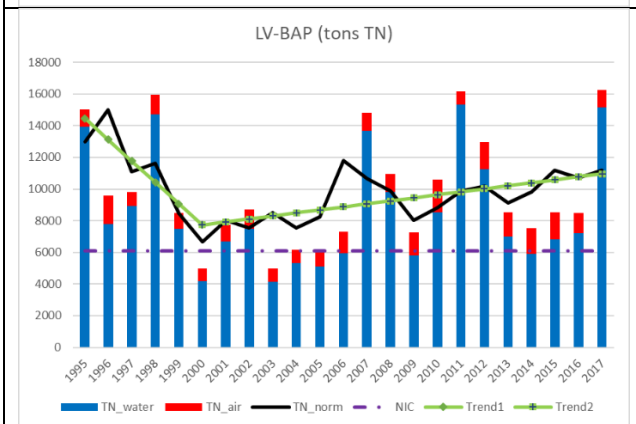
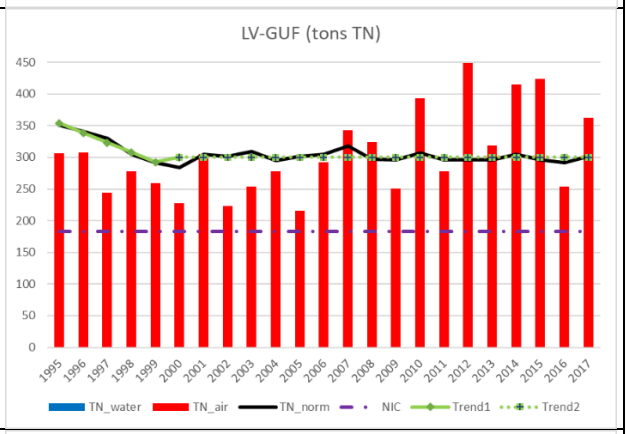
TN_air
TN_norm
NIC
Trend1
Trend2


LV-BOS (tons TN)
TN_water
TN_air
TN_norm
NIC
Trend1
Trend2


LV-BAP (tons TN)
TN_water
TN_air
TN_norm
NIC
Trend1
Trend2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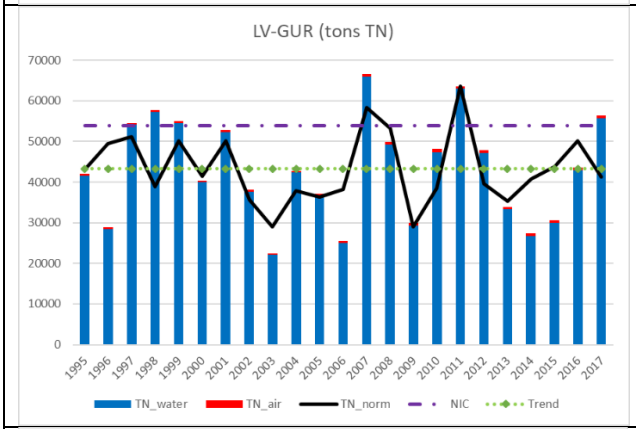
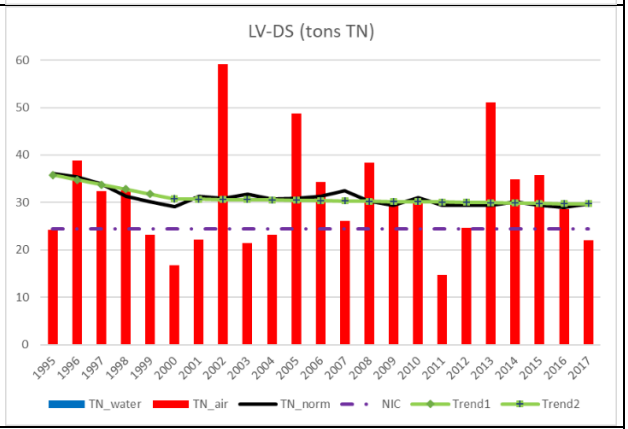
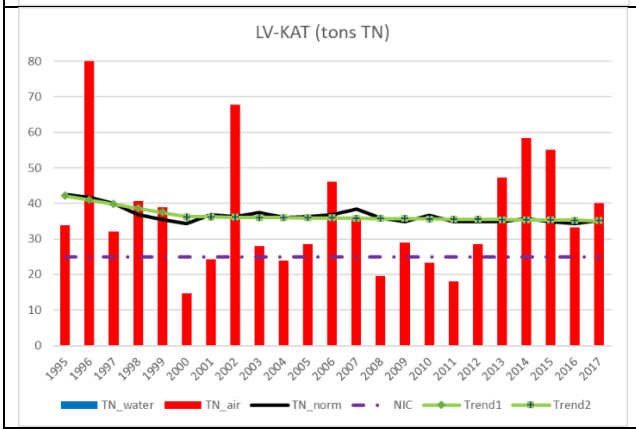
TN_water
TN_air
TN_norm
NIC
Trend1
Trend2


LV-GUR (tons TN)
TN_water
TN_air
TN_norm
NIC
Trend


LV-DS (tons TN)
TN_water
TN_air
TN_norm
NIC
Trend1
Trend2


LV-KAT (tons TN)
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TN_air
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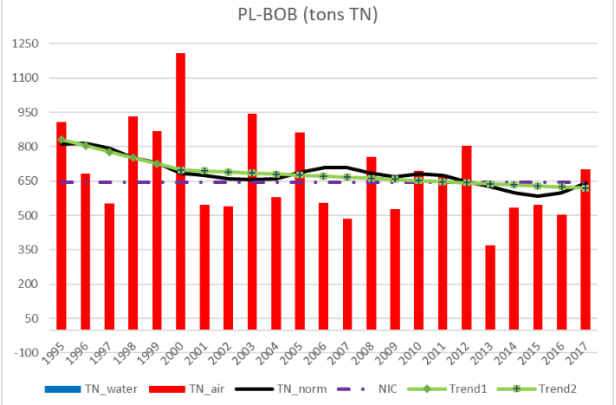
NIC
Trend1
Trend2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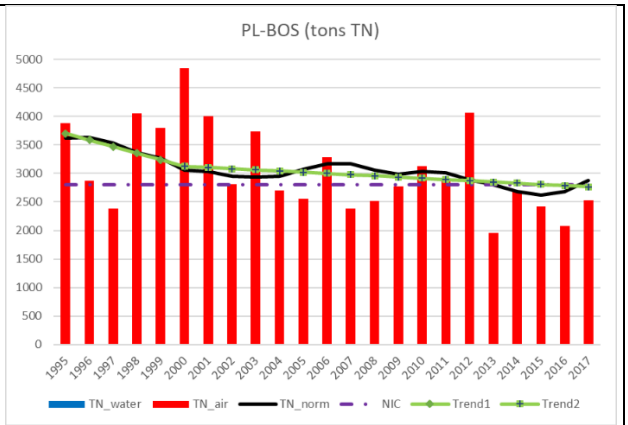
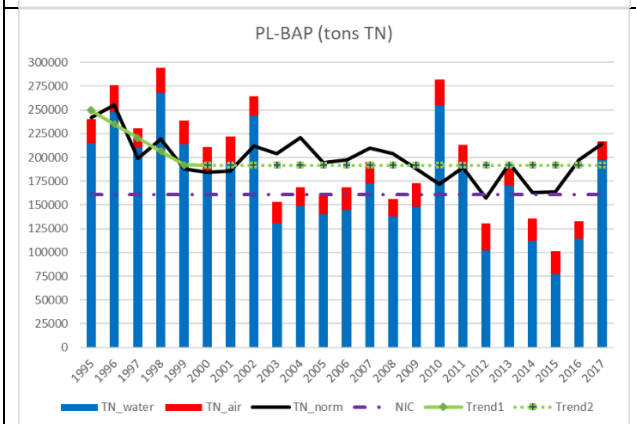
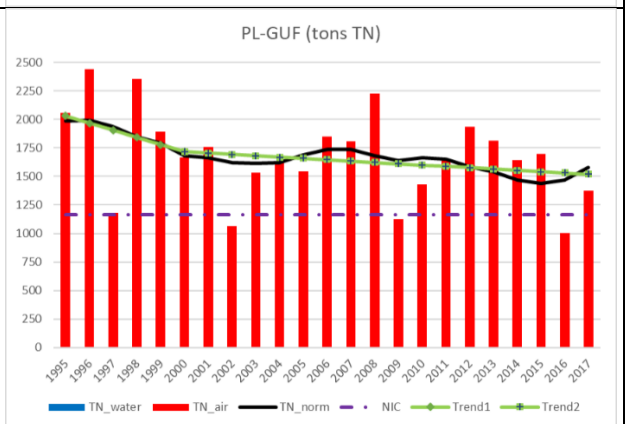
TN_air
TN_norm
NIC
Trend1
Trend2


PL-BOS (tons TN)
TN_water
TN_air
TN_norm
NIC
Trend1
Trend2


PL-BAP (tons TN)
TN_water
TN_air
TN_norm
NIC
Trend1
Trend2


PL-GUF (tons TN)
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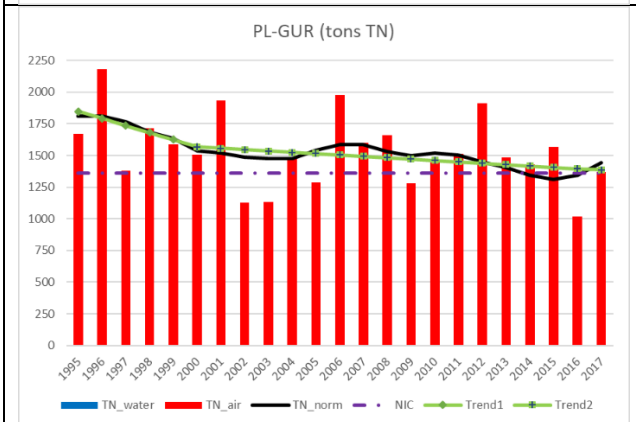
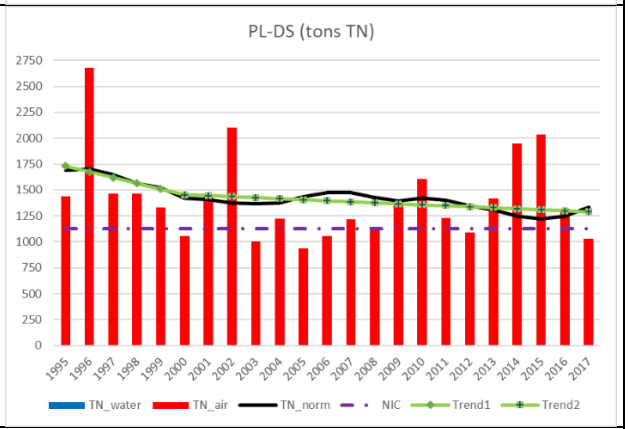
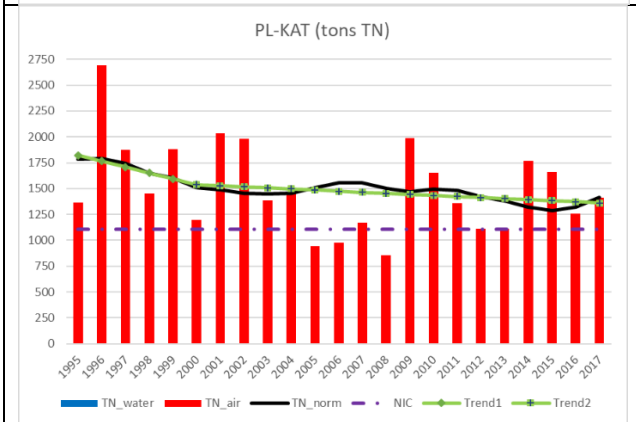
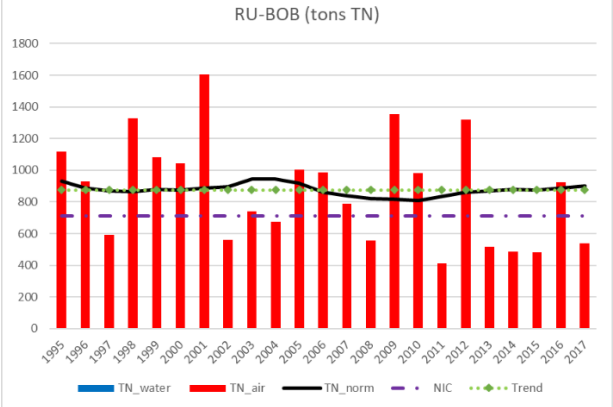
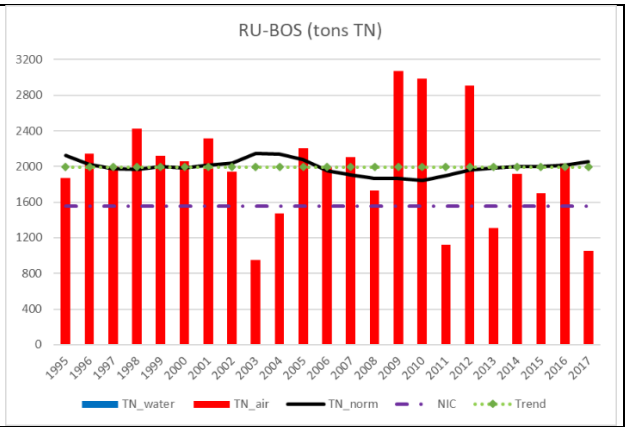
TN_air
TN_norm
NIC
Trend1
Trend2

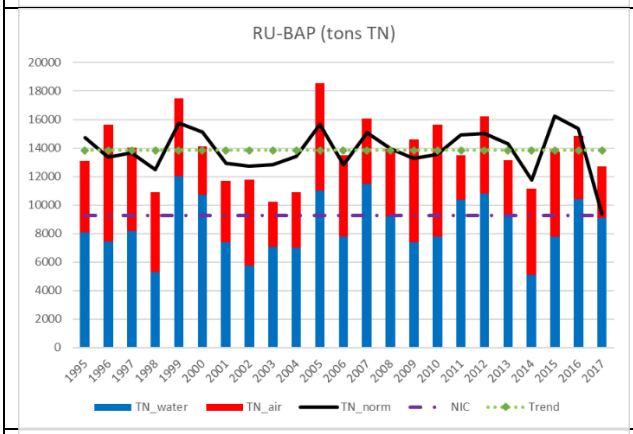

PL-GUR (tons TN)
TN_water
TN_air
TN_norm
NIC
Trend1
Trend2


PL-DS (tons TN)
TN_water
TN_air
TN_norm
NIC
Trend1
Trend2


PL-KAT (tons TN)
TN_water
TN_air
TN_norm
NIC
Trend1
Trend2


RU-BOB (tons TN)
TN_water
TN_air
TN_norm
NIC
Trend


RU-BOS (tons TN)
TN_water
TN_air
TN_norm
NIC
Trend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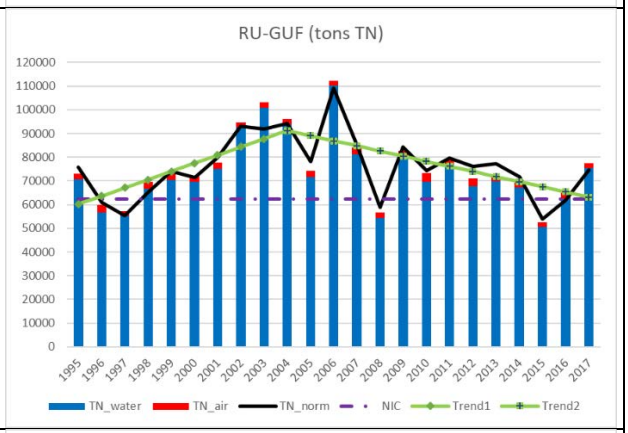
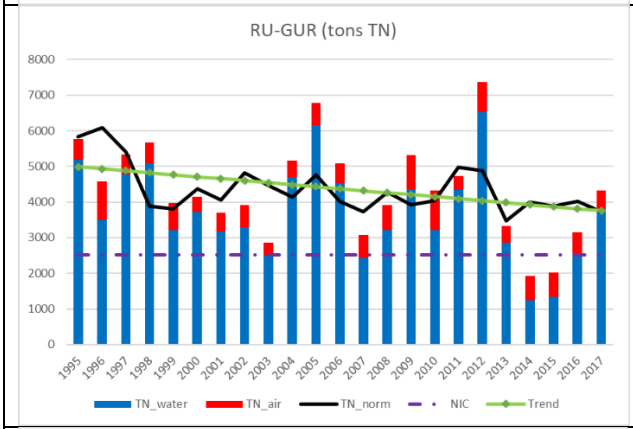
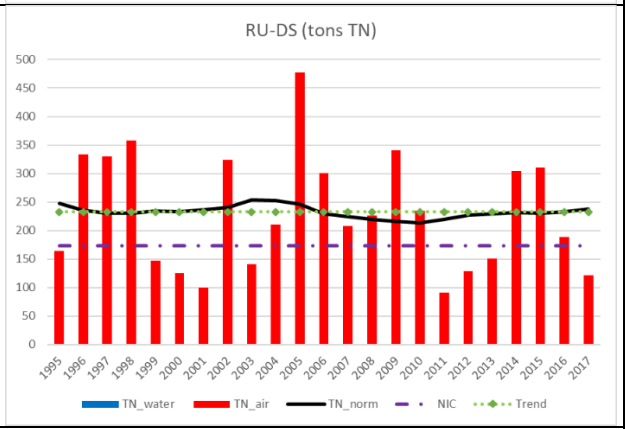
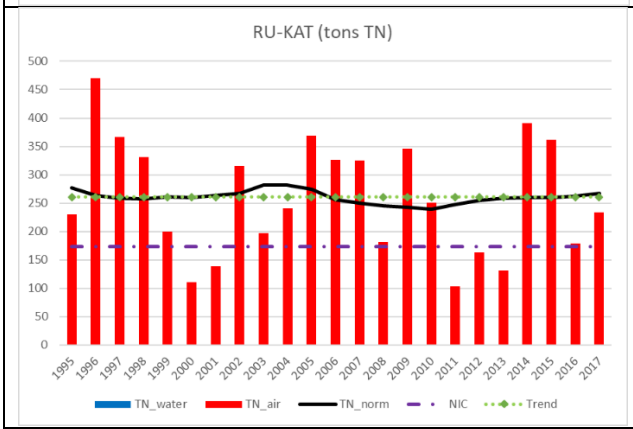
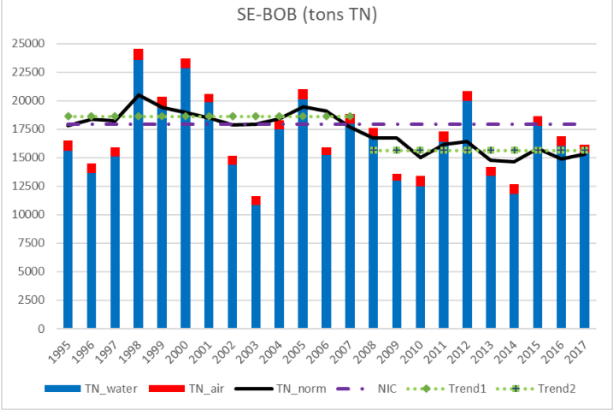
TN_water
TN_air
TN_norm
NIC
Trend

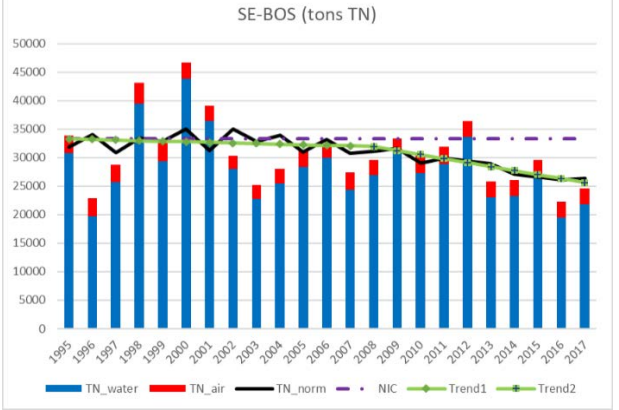

RU-GUF (tons TN)
TN_water
TN_air
TN_norm
NIC
Trend1
Trend2

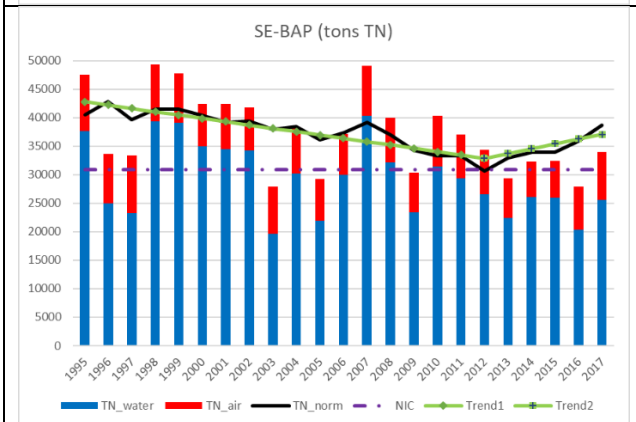

RU-GUR (tons TN)
TN_water
TN_air
TN_norm
NIC
Trend

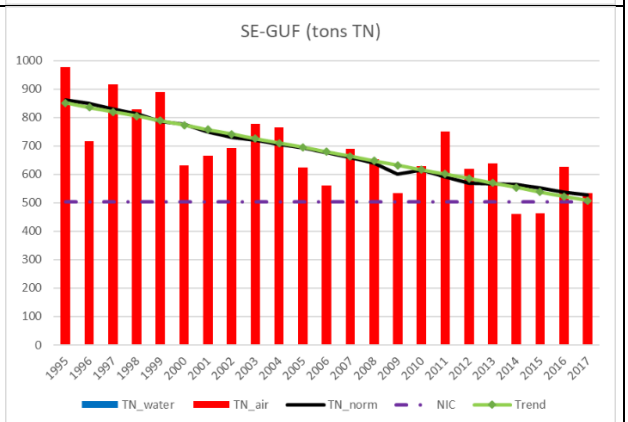

RU-DS (tons TN)
TN_water
TN_air
TN_norm
NIC
Trend

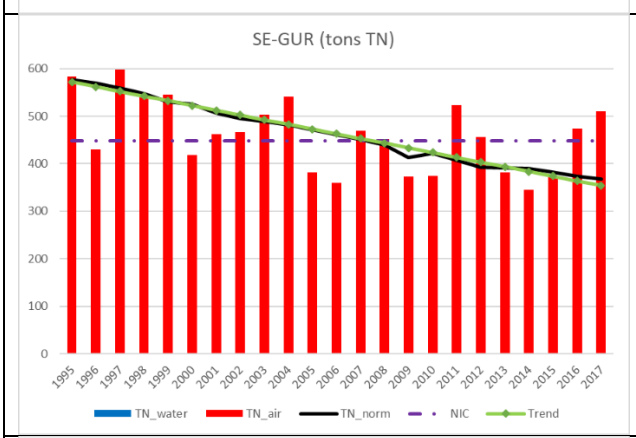

RU-KAT (tons TN)
TN_water
TN_air
TN_norm
NIC
Trend

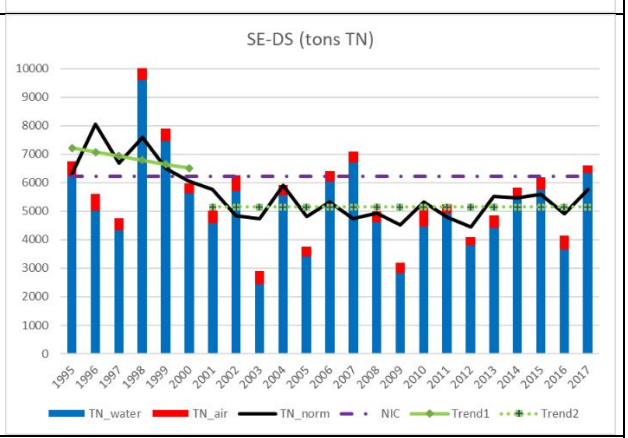

SE-BOB (tons TN)
TN_water
TN_air
TN_norm
NIC
Trend1
Trend2

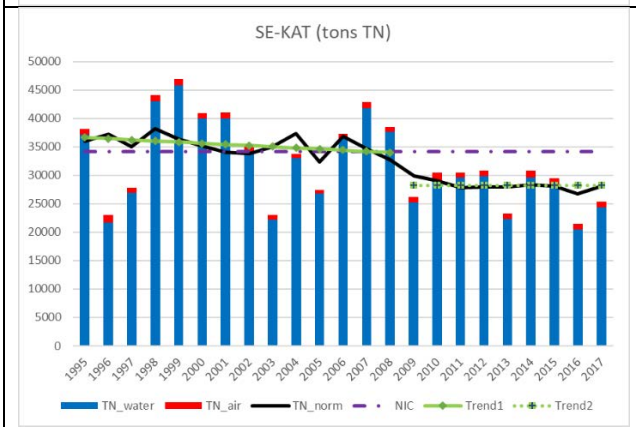

SE-BOS (tons TN)
TN_water
TN_air
TN_norm
NIC
Trend1
Trend2

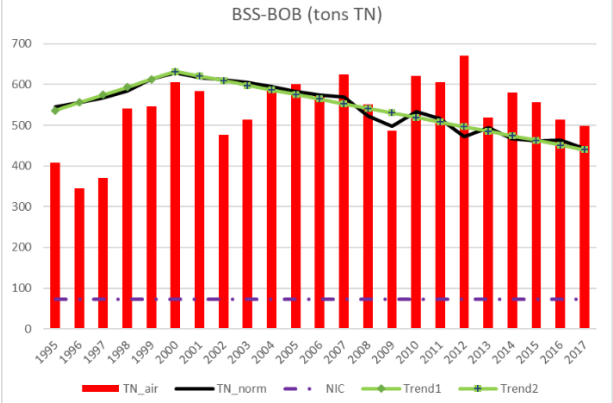

SE-BAP (tons TN)
TN_water
TN_air
TN_norm
NIC
Trend1
Trend2

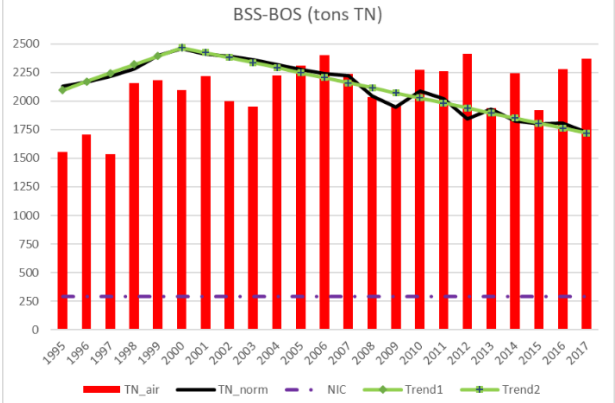

SE-GUF (tons TN)
TN_water
TN_air
TN_norm
NIC
Trend

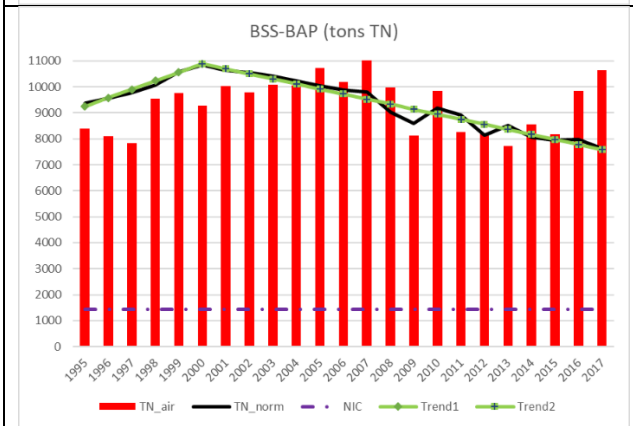

SE-GUR (tons TN)
TN_water
TN_air
TN_norm
NIC
Trend

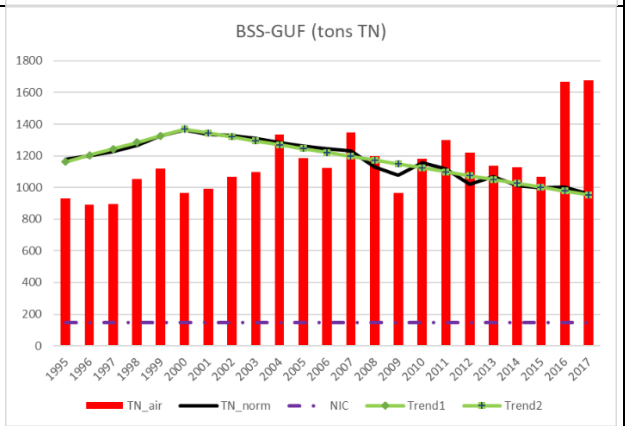

SE-DS (tons TN)
TN_water
TN_air
TN_norm
NIC
Trend1
Trend2

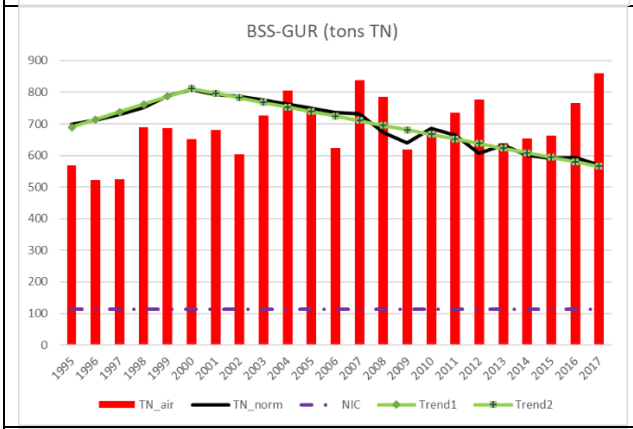

SE-KAT (tons TN)
TN_water
TN_air
TN_norm
NIC
Trend1
Trend2

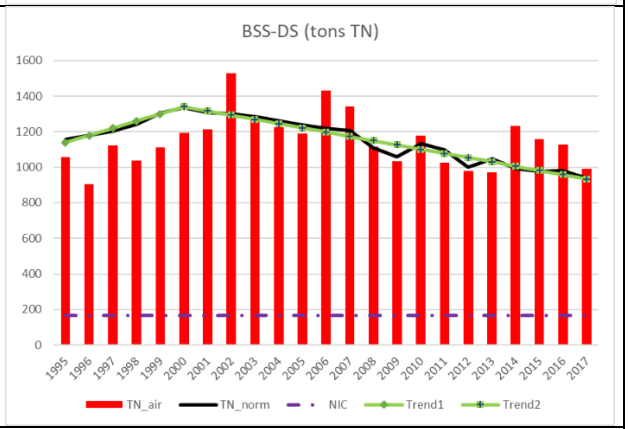

BSS-BOB (tons TN)
TN_air
TN_norm
NIC
Trend1
Trend2

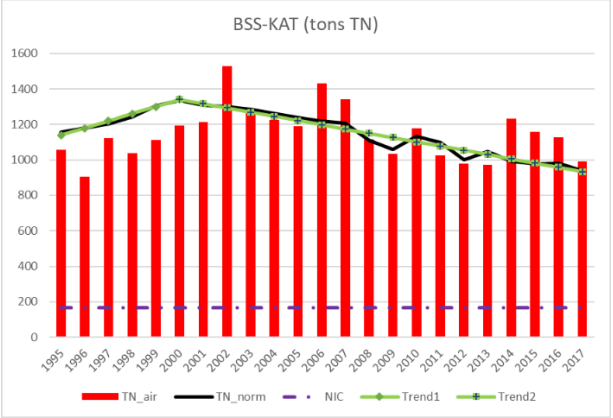

BSS-BOS (tons TN)
TN_air
TN_norm
NIC
Trend1
Trend2

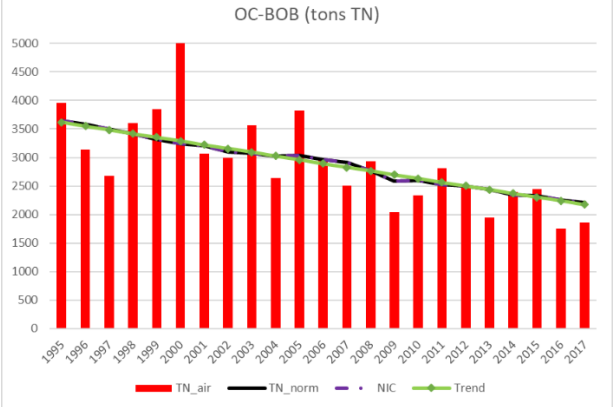

BSS-BAP (tons TN)
TN_air
TN_norm
NIC
Trend1
Trend2

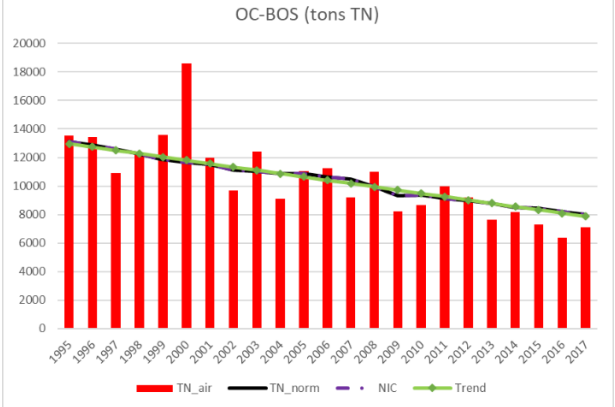

BSS-GUF (tons TN)
TN_air
TN_norm
NIC
Trend1
Trend2

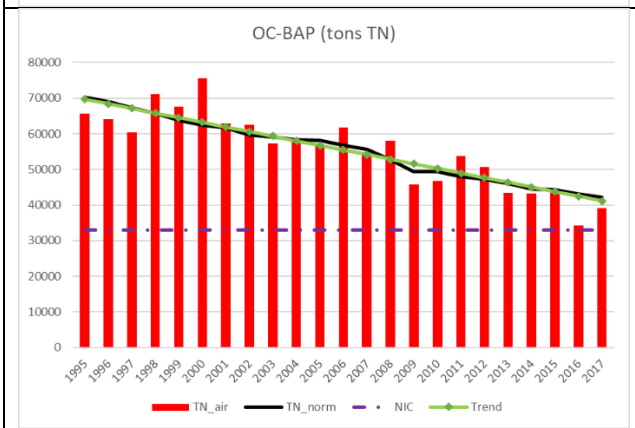

BSS-GUR (tons TN)
TN_air
TN_norm
NIC
Trend1
Trend2

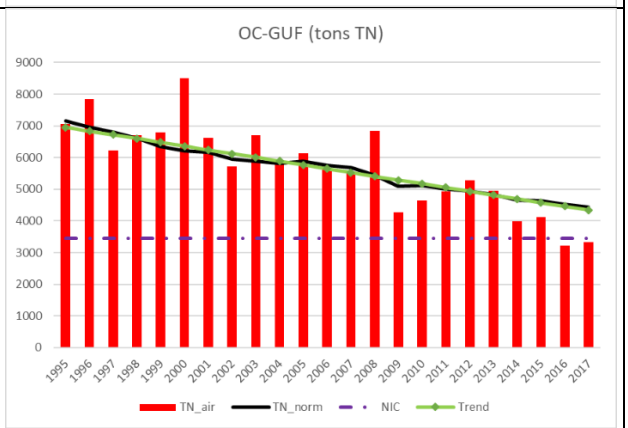

BSS-DS (tons TN)
TN_air
TN_norm
NIC
Trend1
Trend2

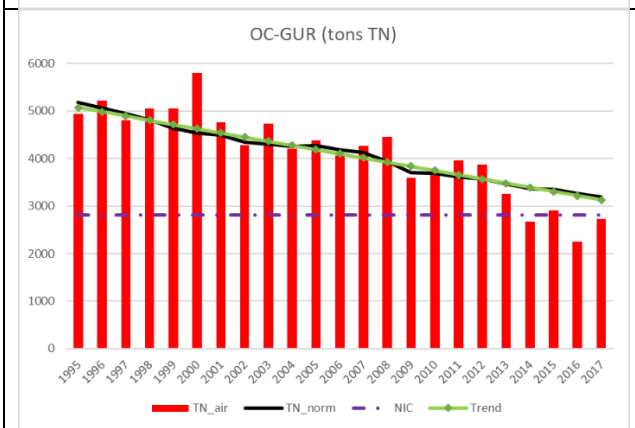

BSS-KAT (tons TN)
TN_air
TN_norm
NIC
Trend1
Trend2

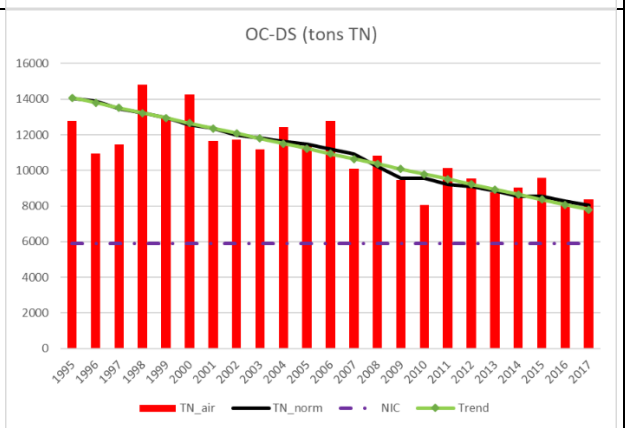

OC-BOB (tons TN)
TN_air
TN_norm
NIC
Trend

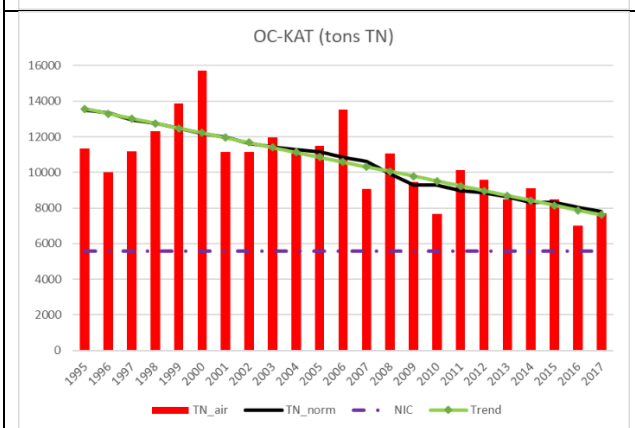

OC-BOS (tons TN)
TN_air
TN_norm
NIC
Trend


OC-BAP (tons TN)
TN_air
TN_norm
NIC
Trend


OC-GUF (tons TN)
TN_air
TN_norm
NIC
Trend


OC-GUR (tons TN)
TN_air
TN_norm
NIC
Trend


OC-DS (tons TN)
TN_air
TN_norm
NIC
Trend


OC-KAT (tons TN)
TN_air
TN_norm
NIC
Trend

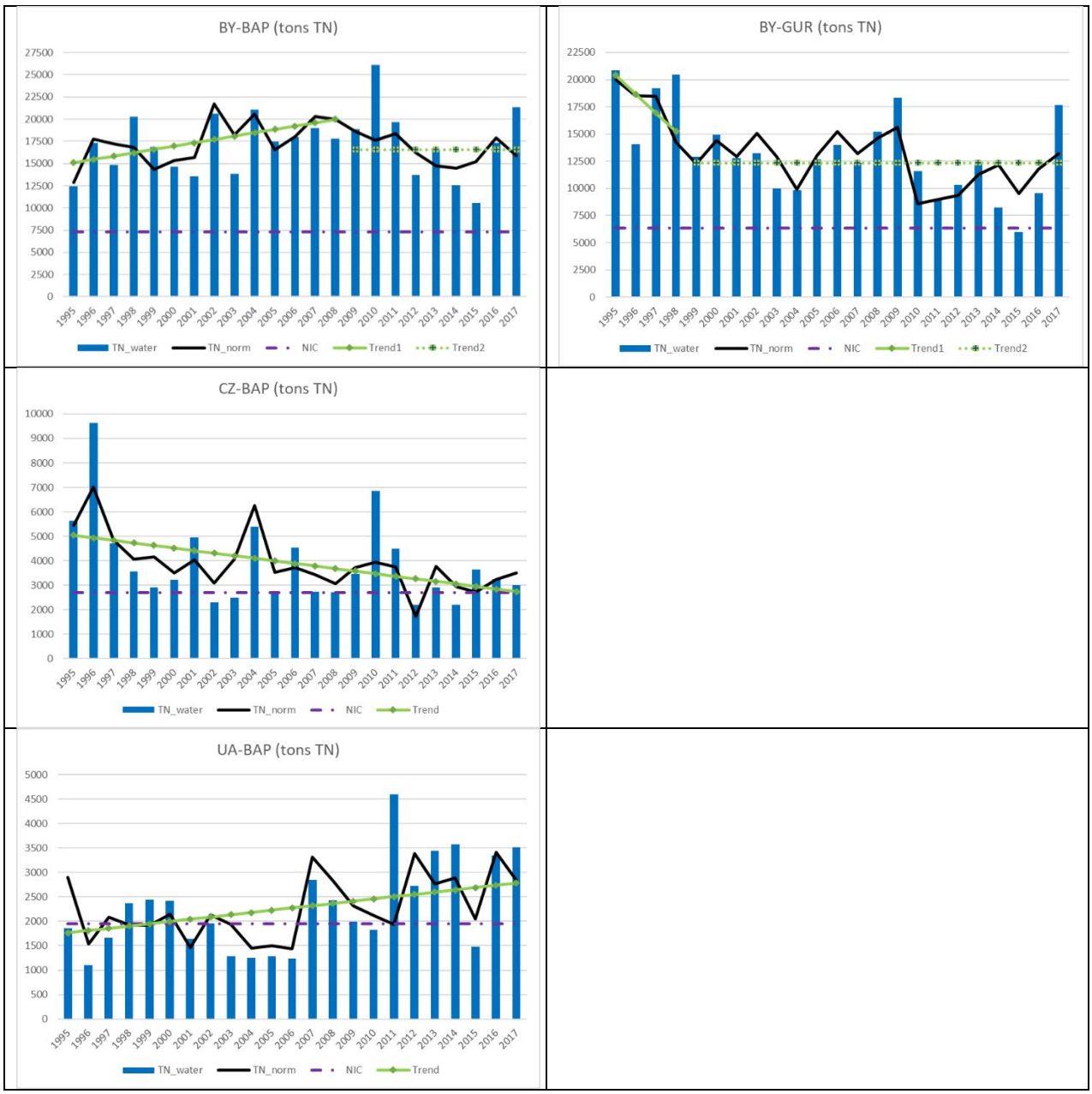
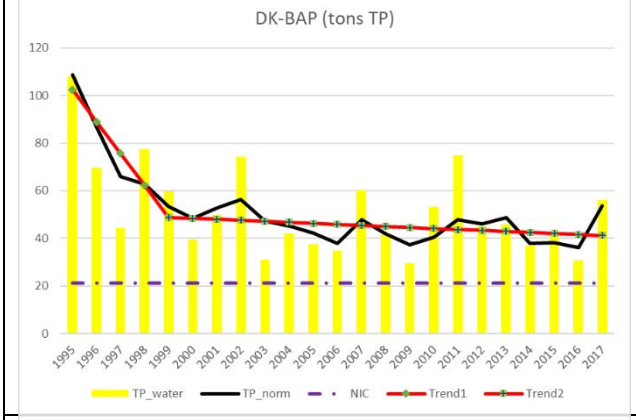
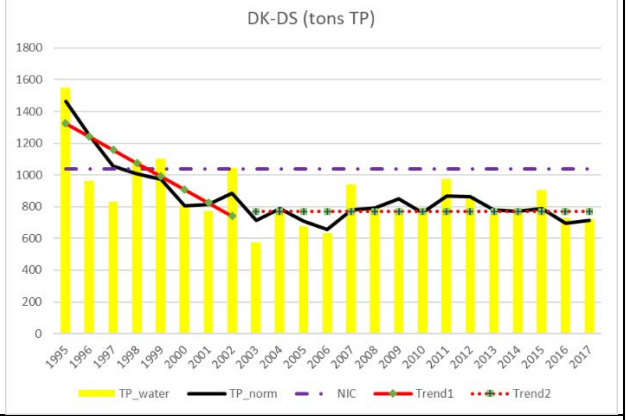


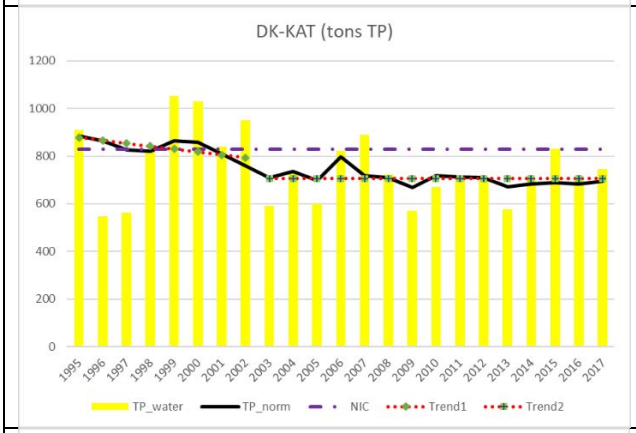
Figure 1A Actual total air- and waterborne annual input of nitrogen (TN) to the Baltic Sea country/source per sub-basins from 1995 to 2017 (tonnes). The normalized annual inputs of nitrogen are given as a black line. The trend line for normalized total nitrogen input is given as a green line with markers. In cases when a break point divides the trend into two parts, the two parts have different markers. (Solid trend line shows statistically significant trend and dotted line - not statistically significant trend). The nutrient input ceiling for total nitrogen as adopted by the 2013 HELCOM Copenhagen Ministerial Meeting is shown as the bold dotted blue line.

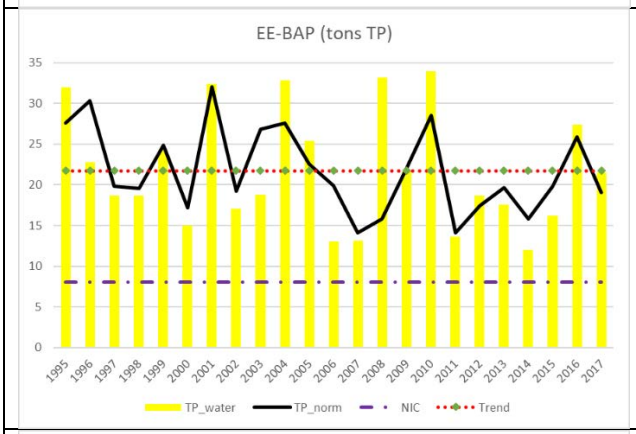
Table 1A: Overview of break point in normalized total nitrogen trend lines in figure 1A.

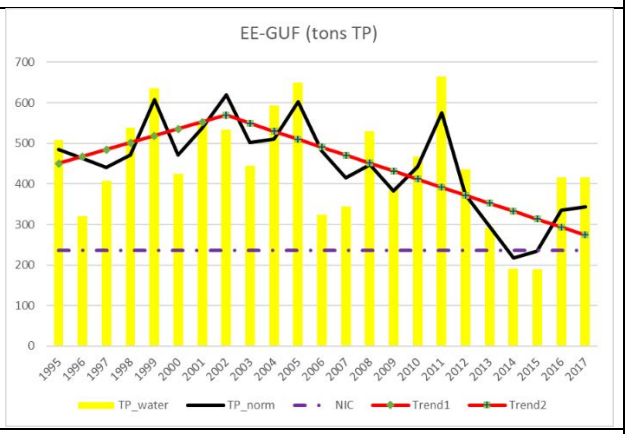
Change points Breakpoints for total TN inputs (year)							
Country/basin	**BOB**	**BOS**	**BAP**	**GUF**	**GUR**	**DS**	**KAT**
Denmark	1999	1999	2012	1999	1999	2011	2010
Estonia	-	-	-	-	-	-	-
Finland	2003	2003	2001	-	-	-	-
Germany	2009	2009	2009	2009	2009	-	2009
Latvia	2000	2000	2000	2000	-	2000	2000
Lithuania	-	-	2002	-	-	-	-
Poland	2000	2000	2000	2000	2000	2000	2000
Russia	-	-	-	2004	-	-	-
Sweden	2008	2008	2012	-	-	2001	2009
Belarus			2009		1999		
Czech Republic			-				
Ukraine			-				
Baltic Sea shipping	2000	2000	2000	2000	2000	2000	2000
Other countries	-	-	-	-	-	-	-

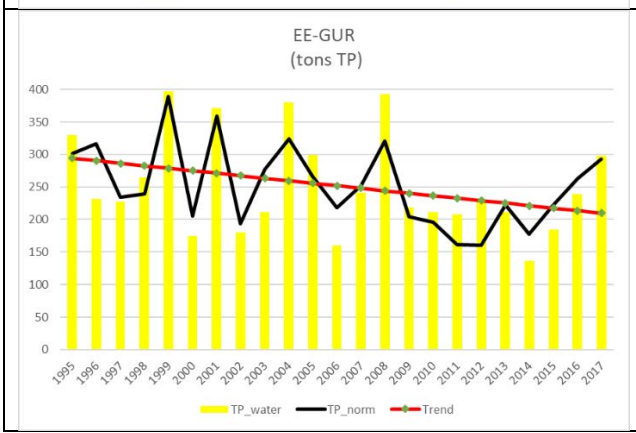

DK-BAP (tons TP)
TP_water
TP_norm
NIC
Trend1
Trend2

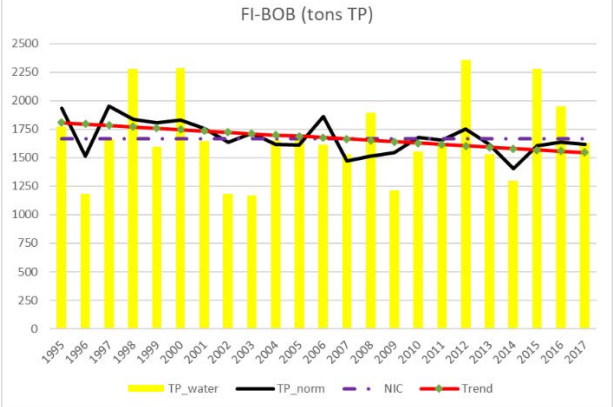

DK-DS (tons TP)
TP_water
TP_norm
NIC
Trend1
Trend2

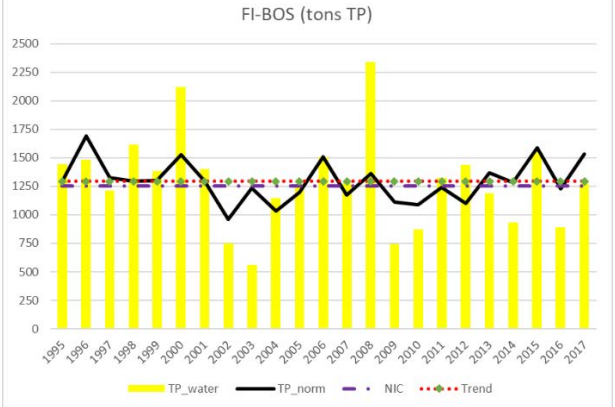

DK-KAT (tons TP)
TP_water
TP_norm
NIC
Trend1
Trend2

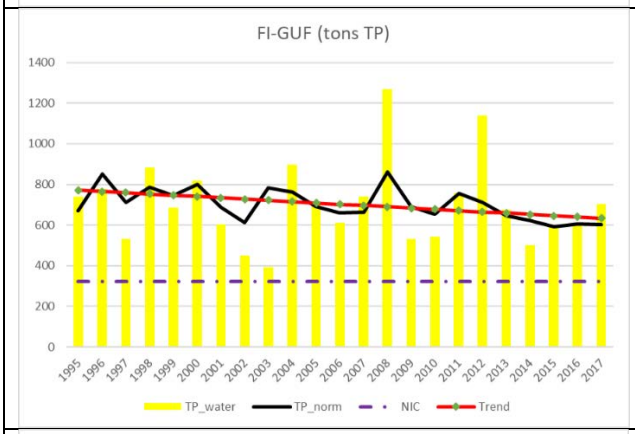

EE-BAP (tons TP)
TP_water
TP_norm
NIC
Trend

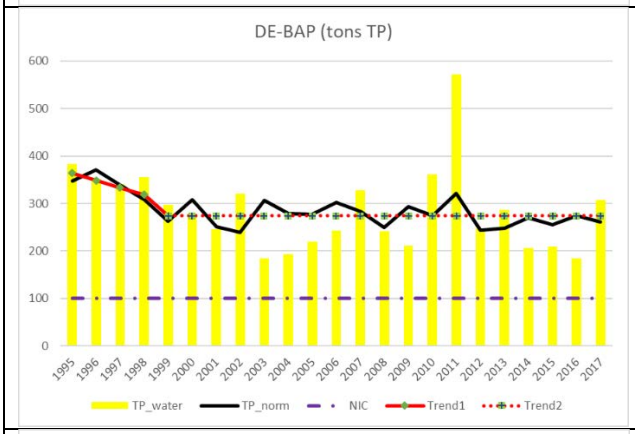

EE-GUF (tons TP)
TP_water
TP_norm
NIC
Trend1
Trend2

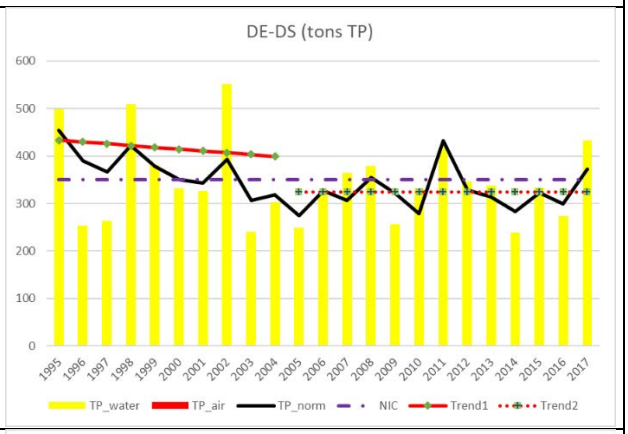

EE-GUR
(tons TP)
TP_water
TP_norm
Trend

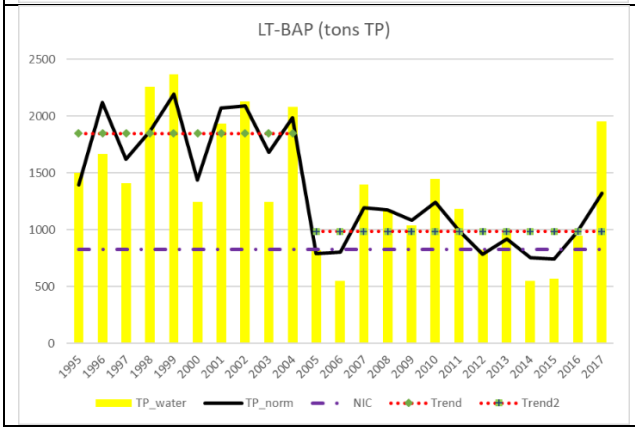

FI-BOB (tons TP)
TP_water
TP_norm
NIC
Trend

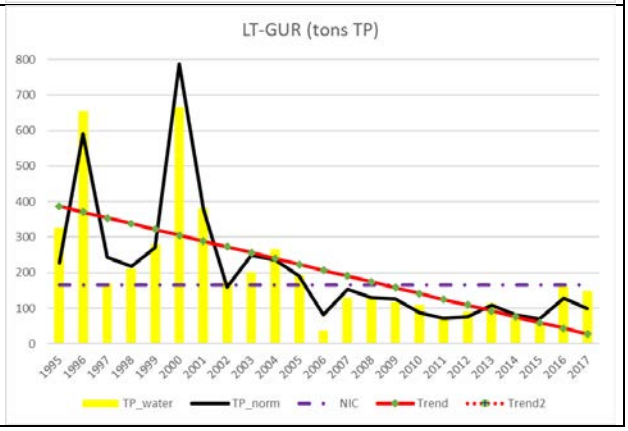

FI-BOS (tons TP)
TP_water
TP_norm
NIC
Trend

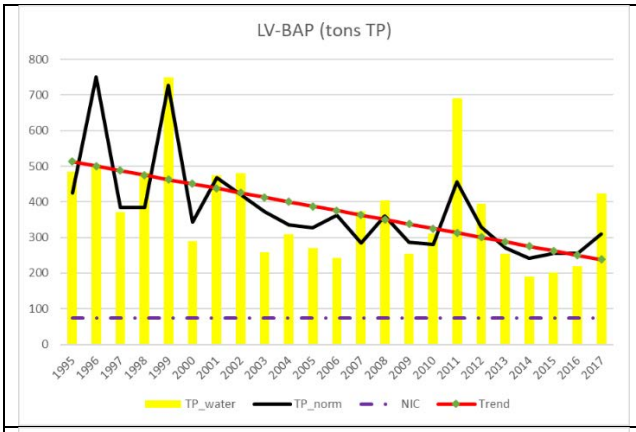

FI-GUF (tons TP)
TP_water
TP_norm
NIC
Trend

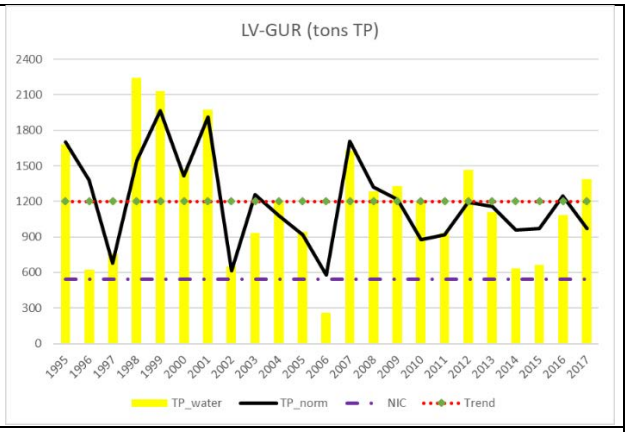

DE-BAP (tons TP)
TP_water
TP_norm
NIC
Trend1
Trend2

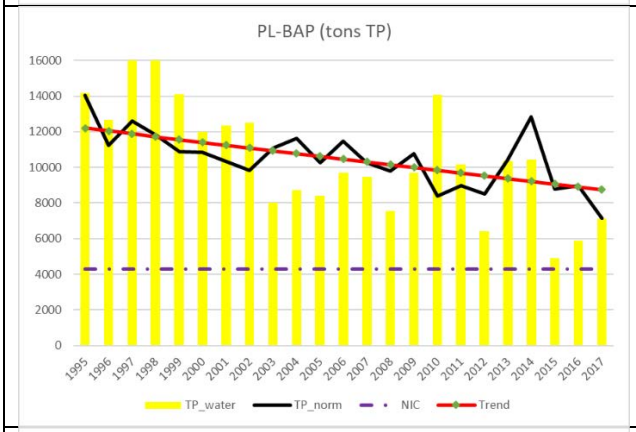

DE-DS (tons TP)
TP_water
TP_air
TP_norm
NIC
Trend1
Trend2

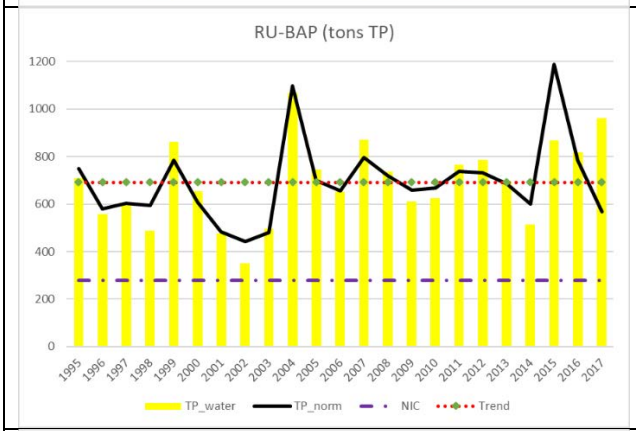

LT-BAP (tons TP)
TP_water
TP_norm
NIC
Trend
Trend2

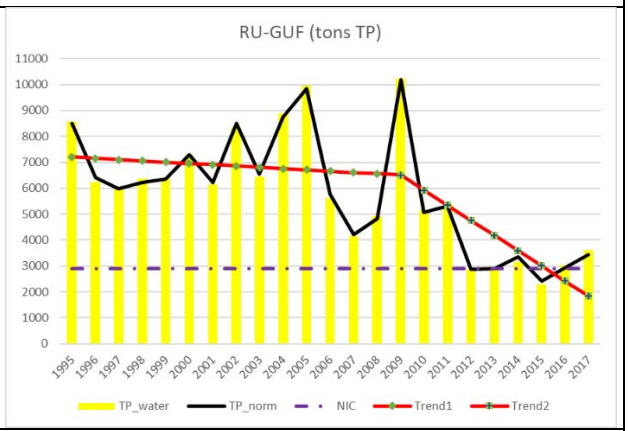

LT-GUR (tons TP)
TP_water
TP_norm
NIC
Trend
Trend2

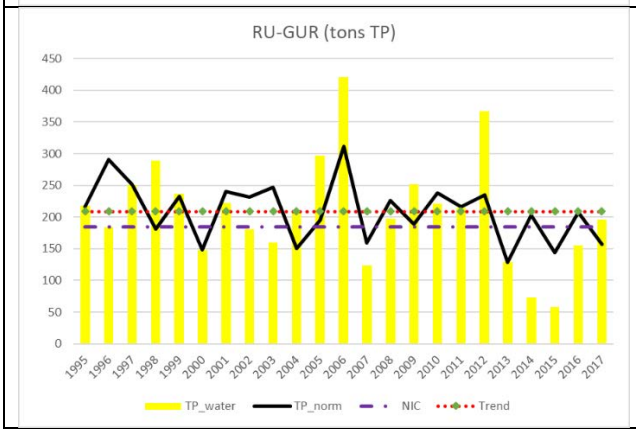

LV-BAP (tons TP)
TP_water
TP_norm
NIC
Trend

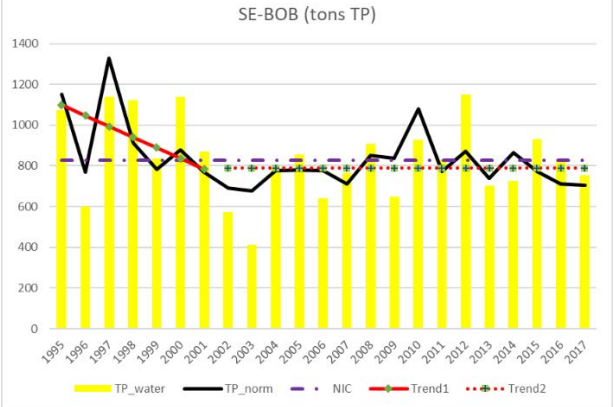

LV-GUR (tons TP)
TP_water
TP_norm
NIC
Trend

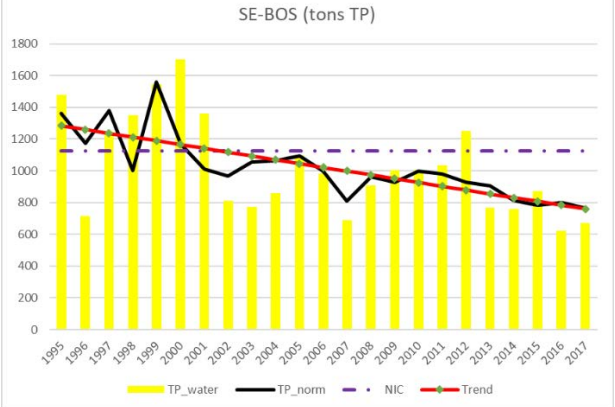

PL-BAP (tons TP)
TP_water
TP_norm
NIC
Trend

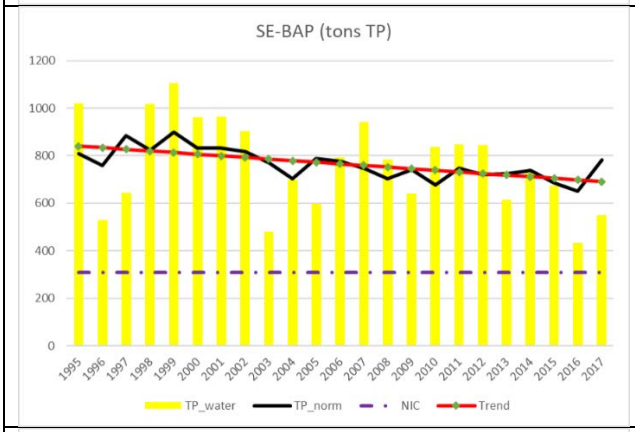

RU-BAP (tons TP)
TP_water
TP_norm
NIC
Trend

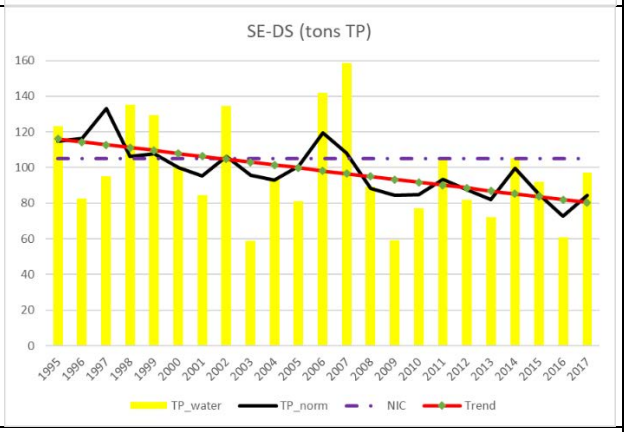

RU-GUF (tons TP)
TP_water
TP_norm
NIC
Trend1
Trend2

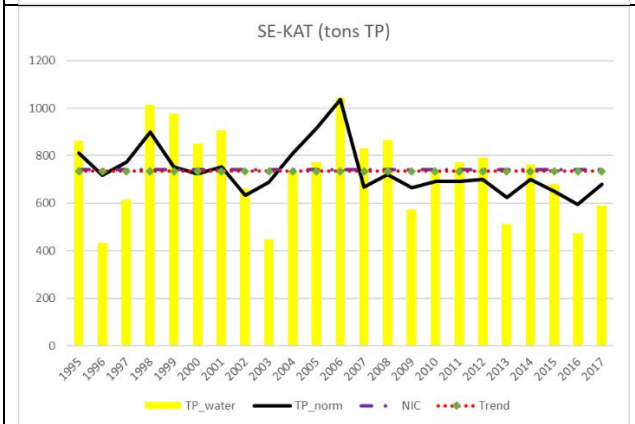

RU-GUR (tons TP)
TP_water
TP_norm
NIC
Trend

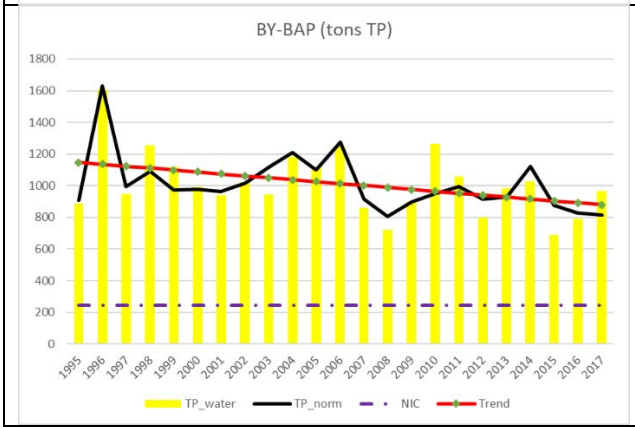

SE-BOB (tons TP)
TP_water
TP_norm
NIC
Trend1
Trend2

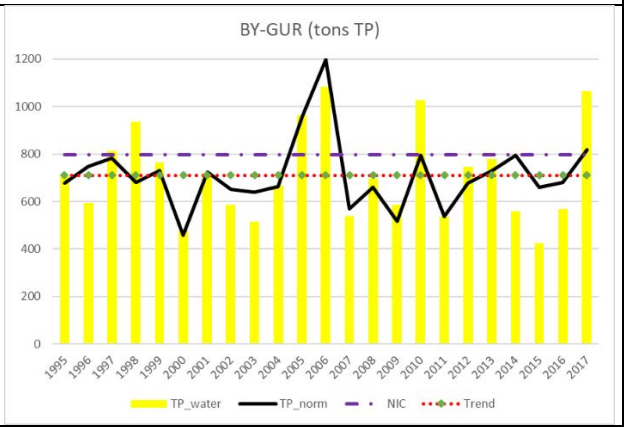

SE-BOS (tons TP)
TP_water
TP_norm
NIC
Trend

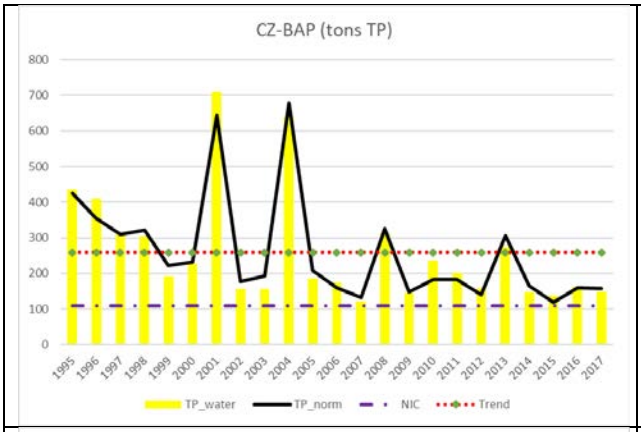

SE-BAP (tons TP)
TP_water
TP_norm
NIC
Trend


SE-DS (tons TP)
TP_water
TP_norm
NIC
Trend


SE-KAT (tons TP)
TP_water
TP_norm
NIC
Trend


BY-BAP (tons TP)
TP_water
TP_norm
NIC
Trend


BY-GUR (tons TP)
TP_water
TP_norm
NIC
Trend



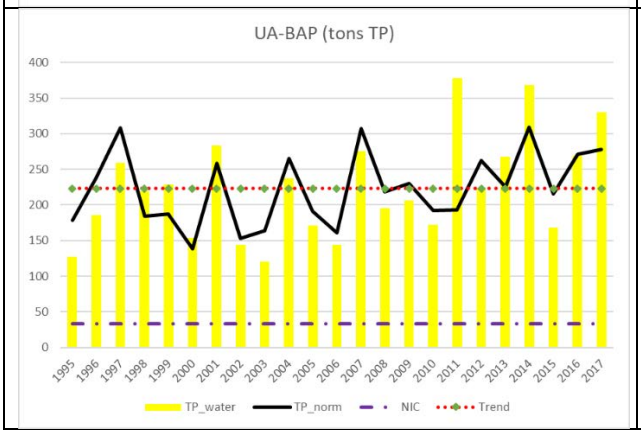


Figure 1B Actual total waterborne annual input of total phosphorus (TN) to the Baltic Sea country/source per sub-basins from 1995 to 2017 (tonnes). The normalized annual inputs of phophorus are given as a black line. The trend line for normalized total phosphorus input is given as a green line with markers. In cases when a break point divides the trend into two parts, the two parts have different markers. (Solid trend line shows statistically significant trend and dotted line - not statistically significant trend). The nutrient input ceiling for phosphorus as adopted by the 2013 HELCOM Copenhagen Ministerial Meeting is shown as the bold dotted blue line.

Table 1B: Overview of break point in normalized total phosphorus trend lines in figure 1B.

Change points Breakpoints (year)							
Country/basin	**BOB**	**BOS**	**BAP**	**GUF**	**GUR**	**DS**	**KAT**
Denmark			1999			2000	2003
Estonia			-	2002	-		
Finland	-	-		-			
Germany			1999			2005	
Latvia			0		-		
Lithuania			-		-		
Poland			-				
Russia			-	2009	2006		
Sweden	2002	-	-			-	-
Belarus			-		2006		
Czech Republic			-				
Ukraine			-				
Baltic Sea shipping							
Other countries							