



---

<b>Document title</b>	Annual report of the MORS environmental database 1984-2019
<b>Code</b>	4-3
<b>Category</b>	INF
<b>Agenda Item</b>	4 – Data collection, databases and ongoing monitoring programme
<b>Submission date</b>	17.5.2021
<b>Submitted by</b>	Secretariat
<b>Reference</b>	

---

## Background

This document contains the basic graphs for verification of the MORS environmental data compiled by the HELCOM Secretariat. Data for the year 2019 has been included as far as reported by 1 May 2021, noting that the reporting deadline for monitoring data for the year 2019 data is 1 September 2020.

German seawater and sediment samples were not received by 1 May 2021. Russian and Latvian data submission for 2019 data was not received before 1 May 2021.

Following attachments contain database extractions used for the figures 1-9 in this document and are available in the meeting site document library.

Att1 MORS Environment Database 2021 updated version with reported 2019 data and corrections of historical data

Att2 Reported data for 2019 formatted for database import

Att3 Fish data extraction and figures

Att4 Fucus data extraction and figures

Att5 Seawater surface data extraction and figures

Att6 Seawater bottom data extraction and figures

Att7 Sediment data extraction and figures

## Action

The Meeting is invited to:

- take note, consider and comment on the information as needed.
- check and verify that reported national data is correctly included in the database

## CALCULATION PRINCIPLES OF THE ENVIRONMENTAL DATA

### BIOTA

Concentrations of  $^{137}\text{Cs}$  and  $^{90}\text{Sr}$  in fish muscle have been reported on herring (*Clupea harengus*). Concentrations of  $^{137}\text{Cs}$  has been reported on cod (*Gadus morhua*), and plaice (*Pleuronectes platessa*) and flounder (*Platichthys flesus*) data of 1984-2018 as wet weight values of fish muscle. Reported dry weight concentrations have been converted to wet weight values. As a result average concentrations and uncertainties have been calculated for each species (plaice and flounder together), for both nuclides and by basin and year. Uncertainties are included in the Attachment excel files.

Two different tissue types for herring muscle have been reported separately. Concentrations in herring have been analyzed for fillets (flesh without bones) and whole fish (without head and entrails). Concentrations in cod and flounder and plaice muscle have been reported only on fillets. Plaice and flounder have been considered as one species in the results.

Concentrations of  $^{137}\text{Cs}$  in bladder wrack (*Fucus vesiculosus*), have been calculated based on dry weight concentrations. Wet weight concentrations have been converted to dry weight values when reported. Average concentrations have been calculated by basin and by year.

All values below the limit of detection (LOD) have been omitted from the calculations. Uncertainty has been calculated and is included in the attachment excel sheets.

### SEAWATER

For seawater  $^{137}\text{Cs}$  concentrations of 1984-2018 have been reported for surface and bottom waters.

The following depth criteria have been used:

For surface water the sampling depth  $\leq 10$  m

1. The average concentrations of nuclides in surface water have been calculated by year and by MORS sub-basin division used in MORS Guidelines and current database reporting.

For bottom water

1. Sampling depth  $> 100$  m; or
2.  $10\text{m} < \text{sampling depth} \leq 100$  m and the difference between the total depth and sampling depth  $\leq 10$  m. The average concentrations of nuclides have been calculated by year and by basin.

All values below the limit of detection (LOD) have been omitted from the calculations. If LOD values have been reported in certain year and basin, the years have been indicated in the figures. Similar calculation method of mean and uncertainty as for biota has been used.

### SEDIMENT

Concentrations of  $^{137}\text{Cs}$  have been analyzed of the reported sediment data of 2000-2018. Average concentrations in Bq/m<sup>2</sup> ( $^{137}\text{Cs}$ ) have been calculated for the following stations:

LL17	59°02,00'N, 21°04,48 E in the Northern Baltic Proper
P1	54°50,00'N, 19°20,00'E in the Gdansk Basin
FBELT1	54°36,00'N, 11°13,00'E in the Arkona Basin

Only surface sediment (0-10 cm) concentrations has been used for figures.

All values below the limit of detection (LOD) have been omitted from the calculations. Reported LOD values have been indicated as asterisks in the graphs. No uncertainty has been reported on sediment data due to the very high variation between the samples (sliced sediment).

## ATTACHMENTS

Following attachments contain database extractions used for the figures 1-9 in this document and are available in the meeting site document library.

Att1 MORS Environment Database 2020 updated version with 2018 data

Att2 Reported data for 2018 formatted for database import

Att3 Fish data extraction and figures

Att4 Fucus data extraction and figures

Att5 Seawater surface data extraction and figures

Att6 Seawater bottom data extraction and figures

Att7 Sediment data extraction and figures

## DATABASE

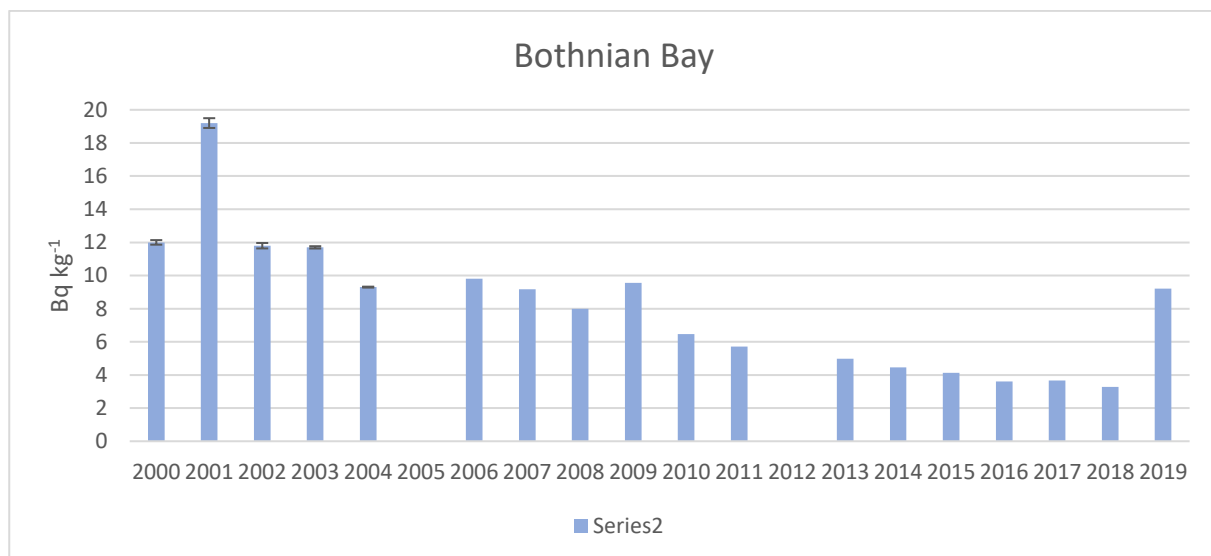
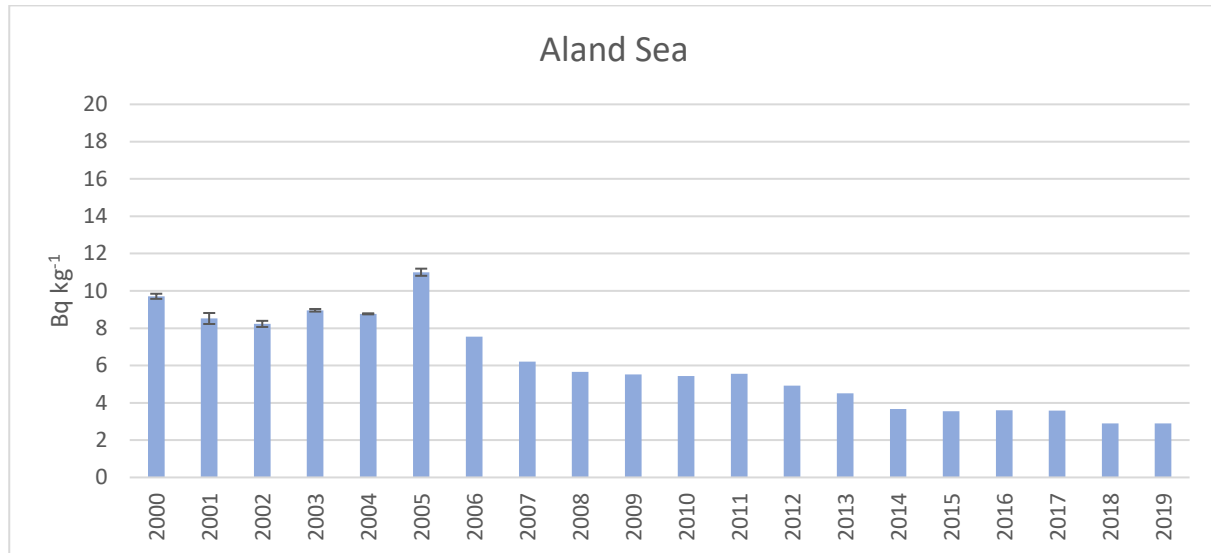
After verification the updated database will be available via HELCOM Metadata catalogue:

<http://metadata.helcom.fi/geonetwork/srv/eng/catalog.search#/metadata/7ee4916b-6d84-4c80-9bea-e8f8572c368a>

## THE LIST OF GRAPHS OF THE MORS ENVIRONMENTAL DATA 2018

BIOTA

HERRING



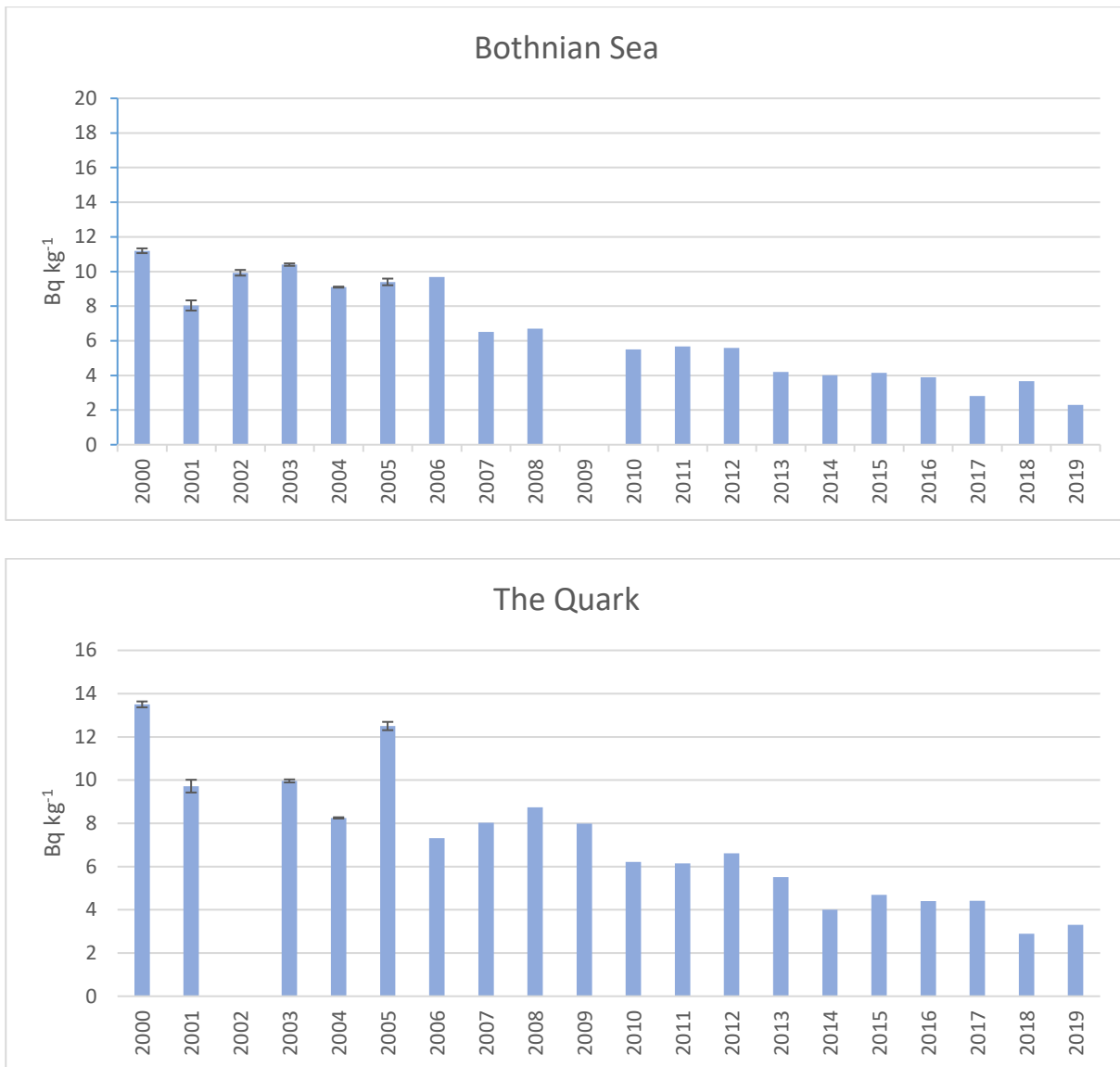
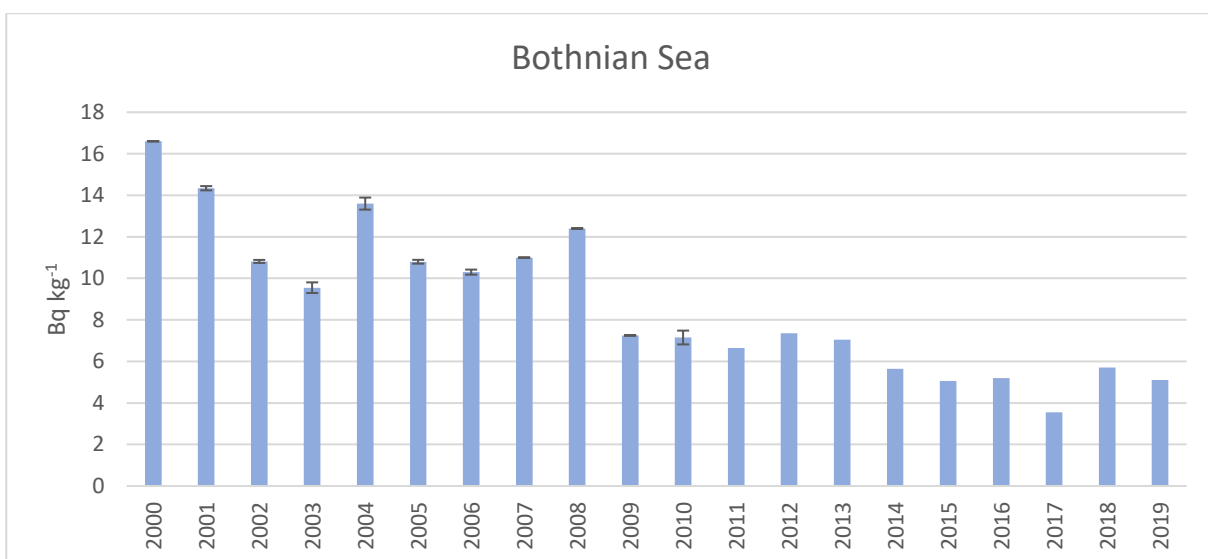
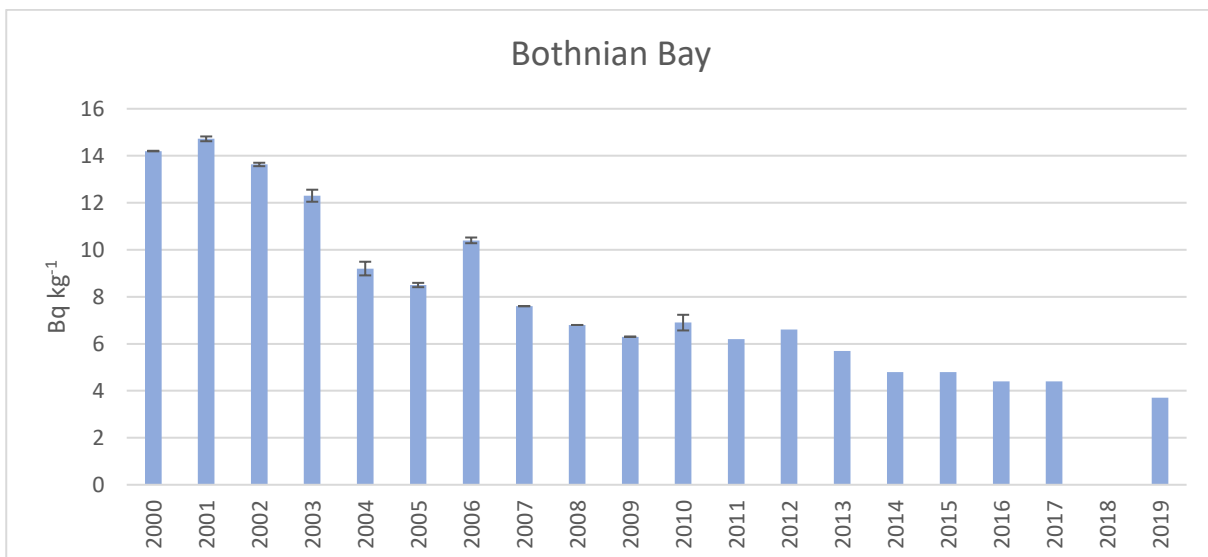
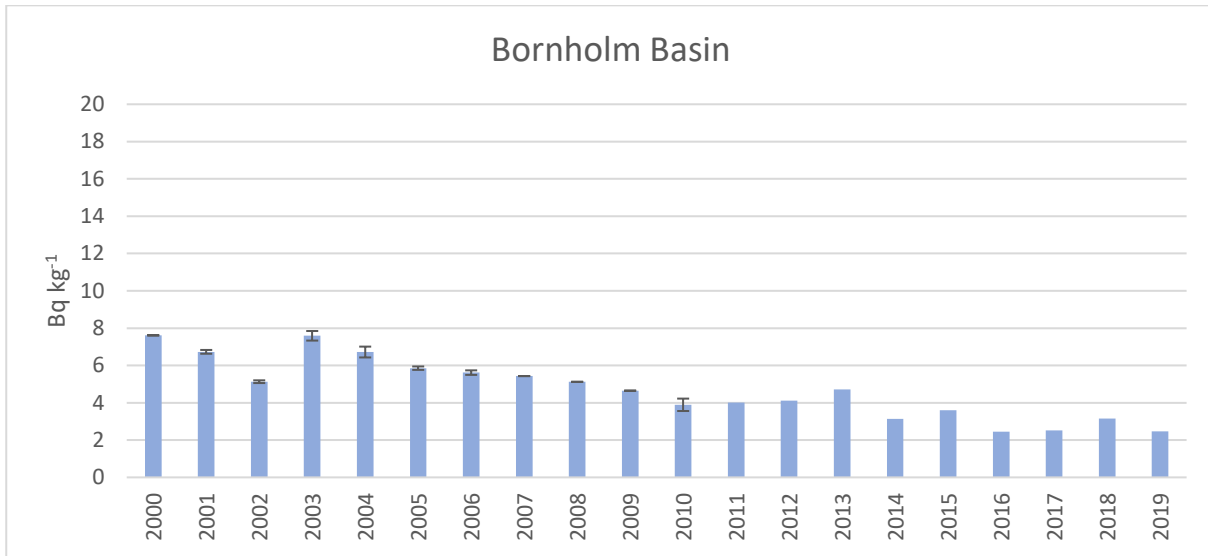
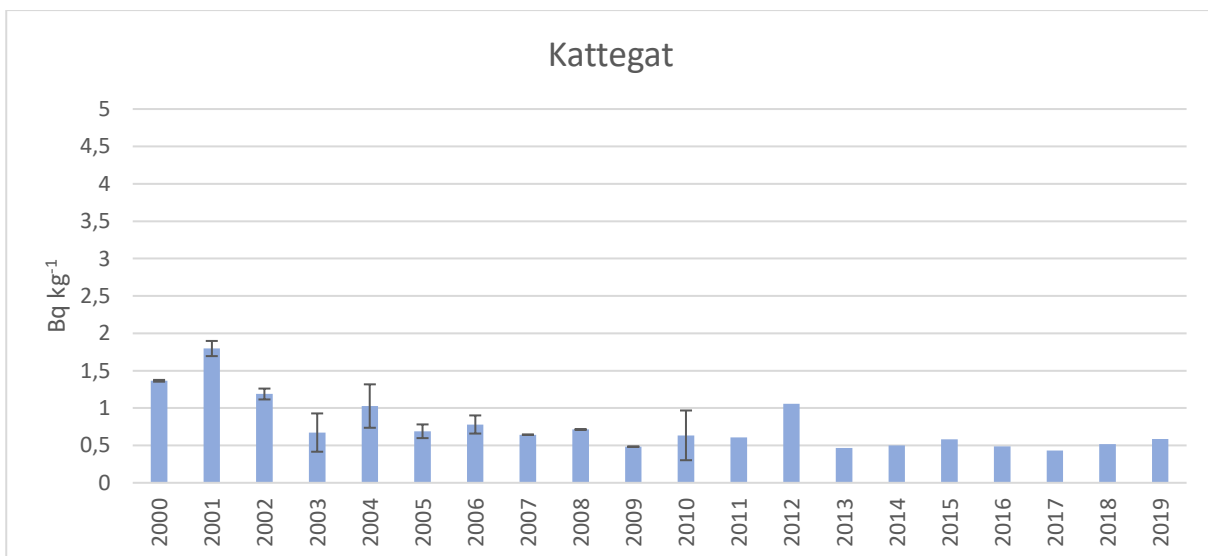
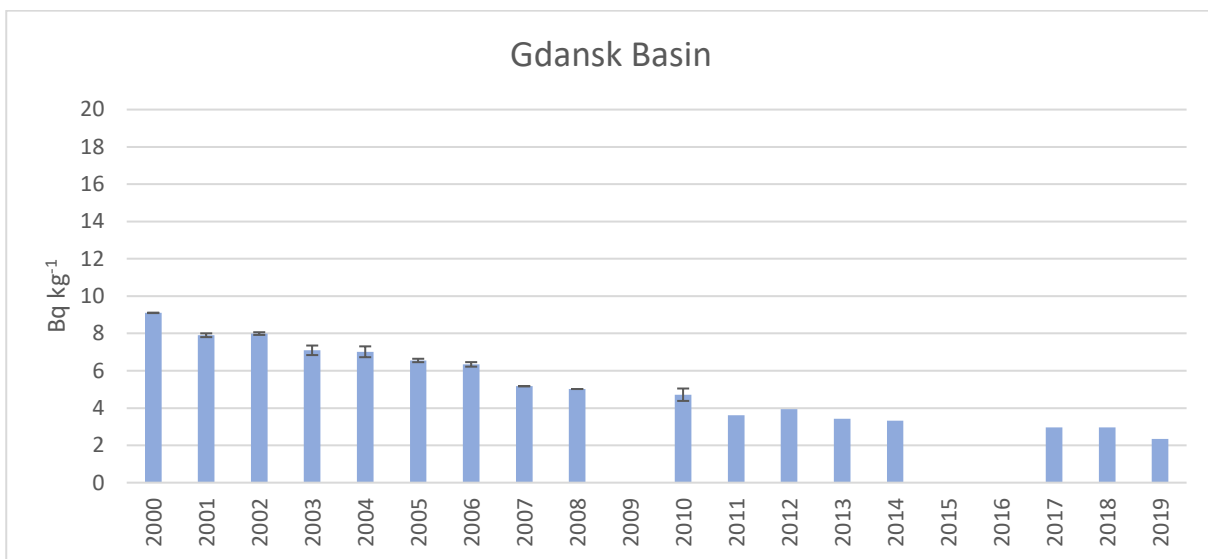
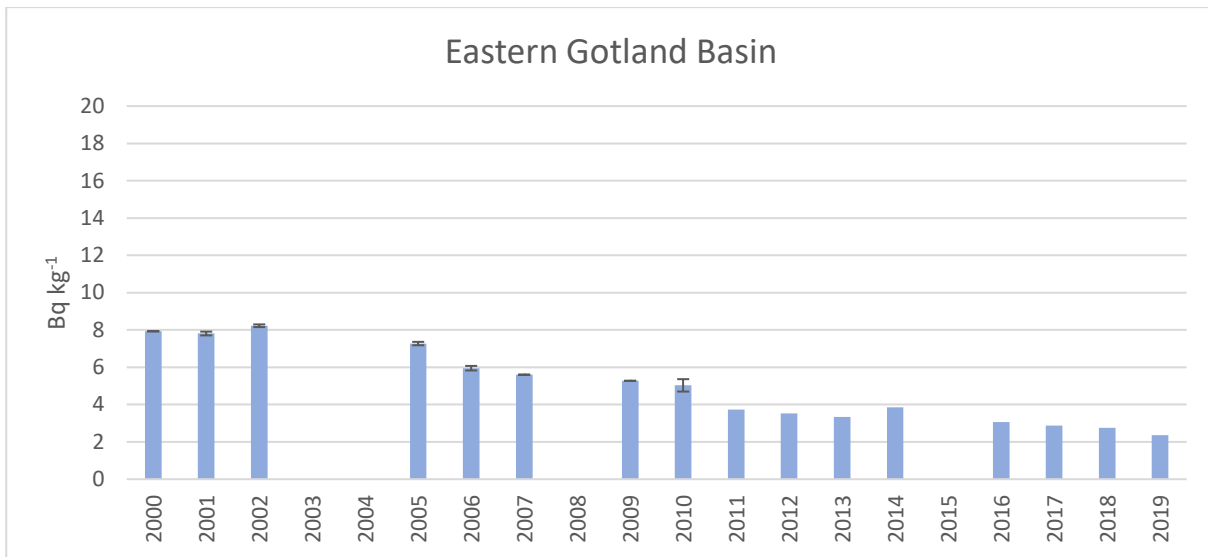


Figure 1.  $^{137}\text{Cs}$  ( $\text{Bq kg}^{-1}$  of wet weight) in herring muscle (without head and entrails) 2000-2019.





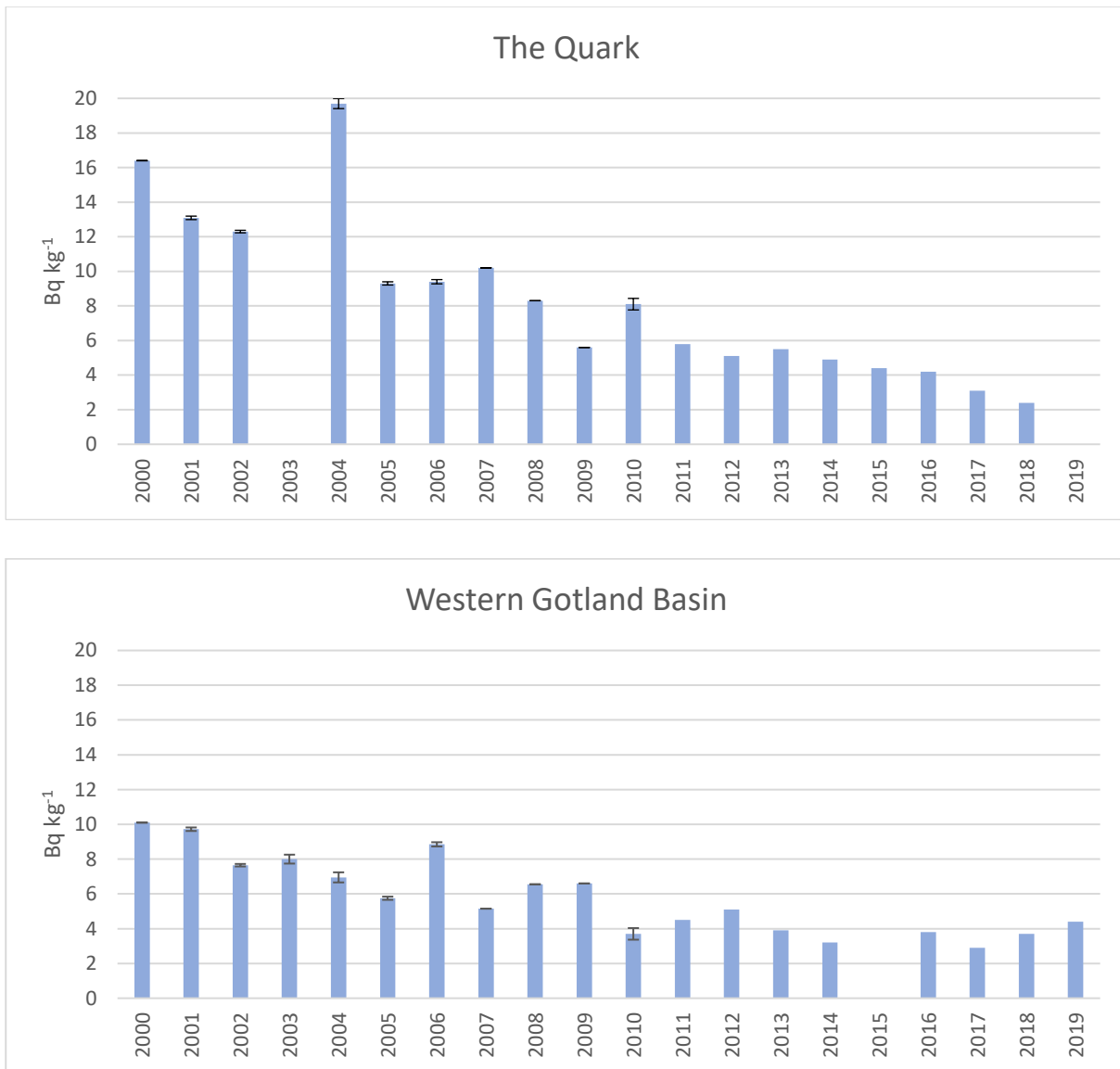
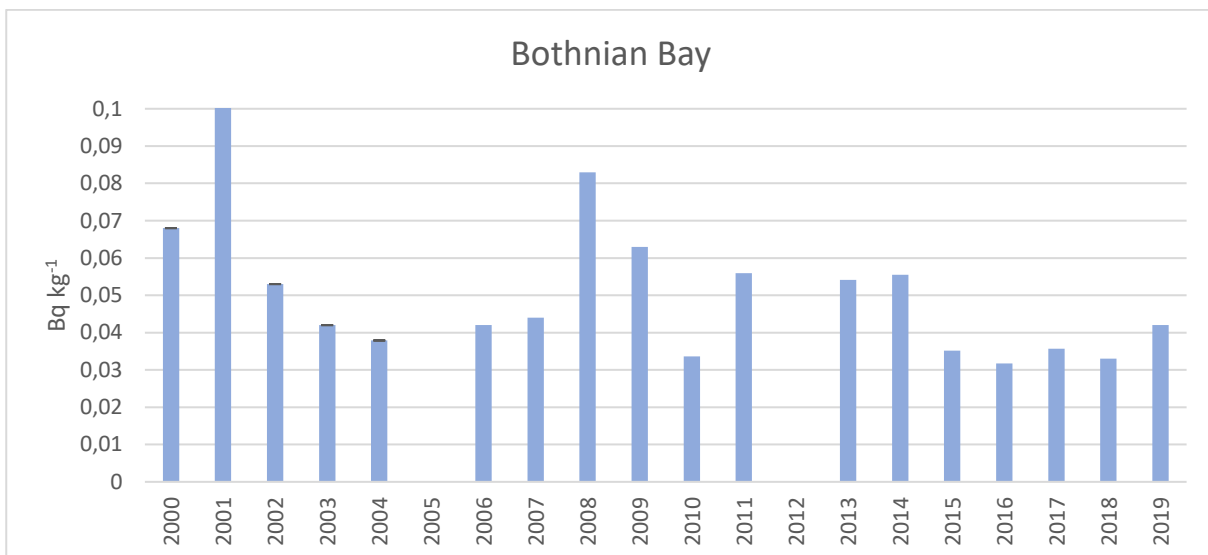
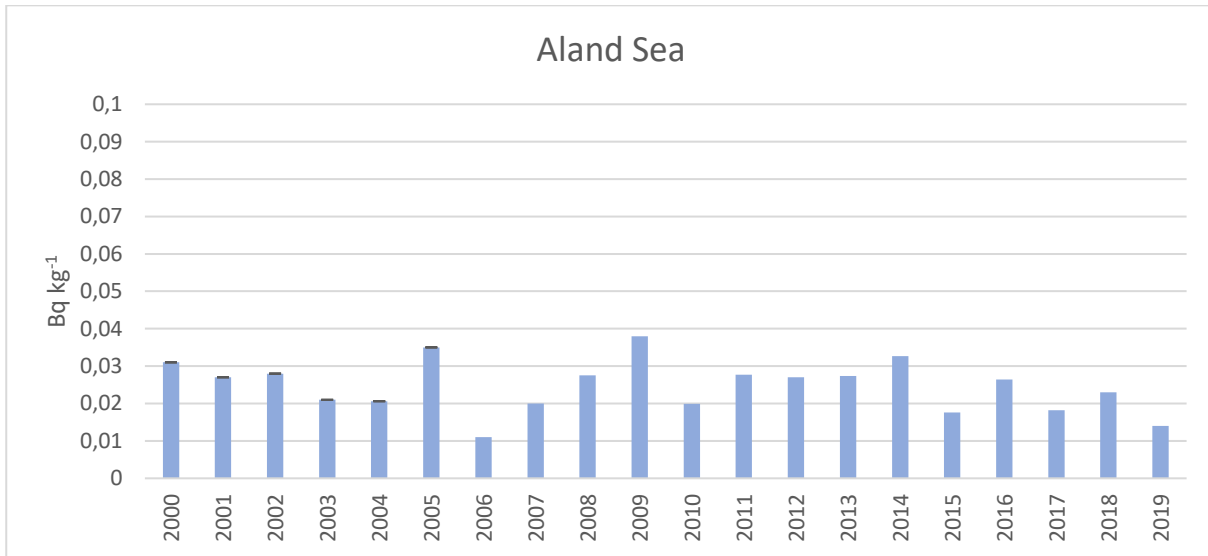


Figure 2.  $^{137}\text{Cs}$  ( $\text{Bq kg}^{-1}$  of wet weight) in herring muscle (fillets) 2000-2019. Note variable scale in graphs.





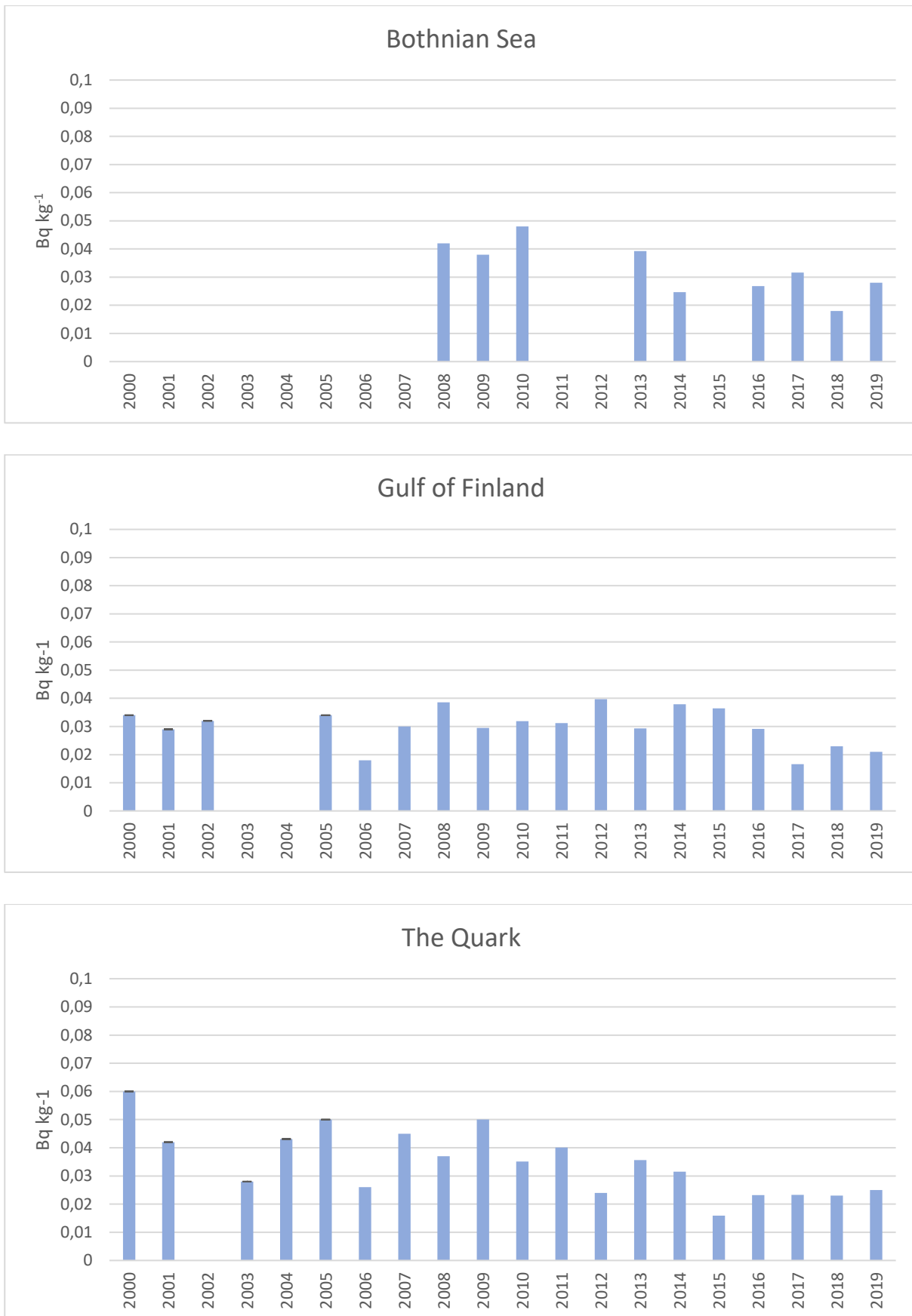
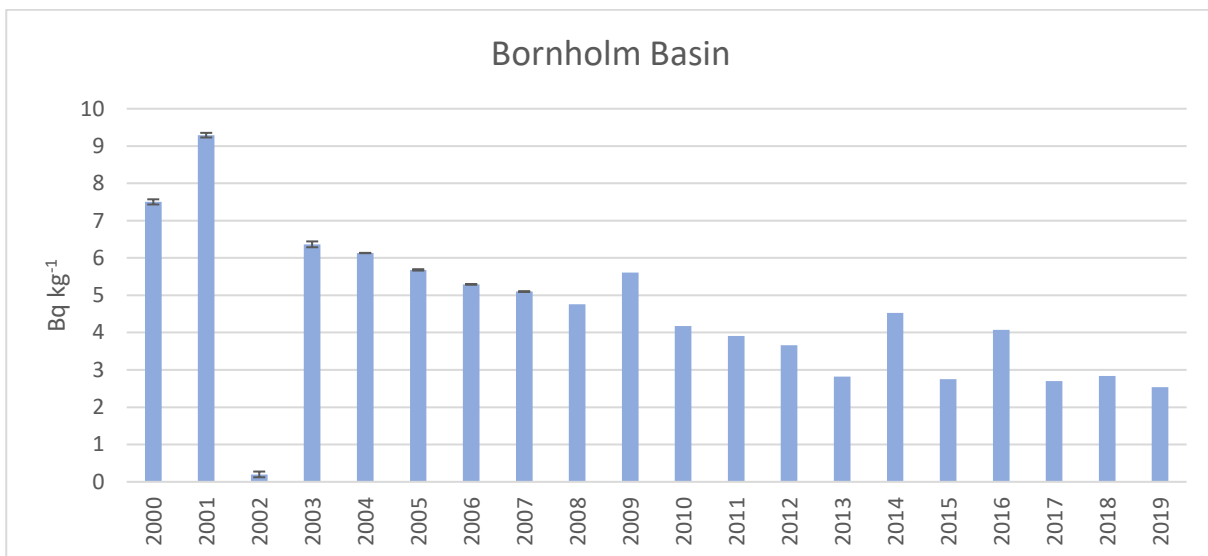
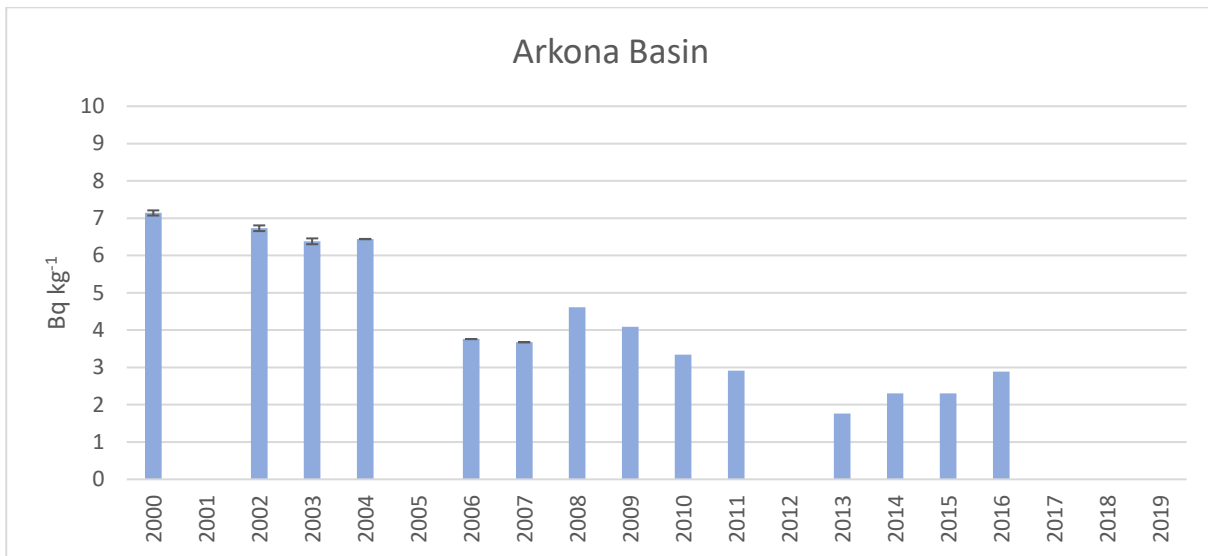


Figure 3.  $^{90}\text{Sr}$  (Bq kg<sup>-1</sup> of wet weight) in herring muscle (without head and entrails) 2000-2019.

## PLAICE AND FLOUNDER



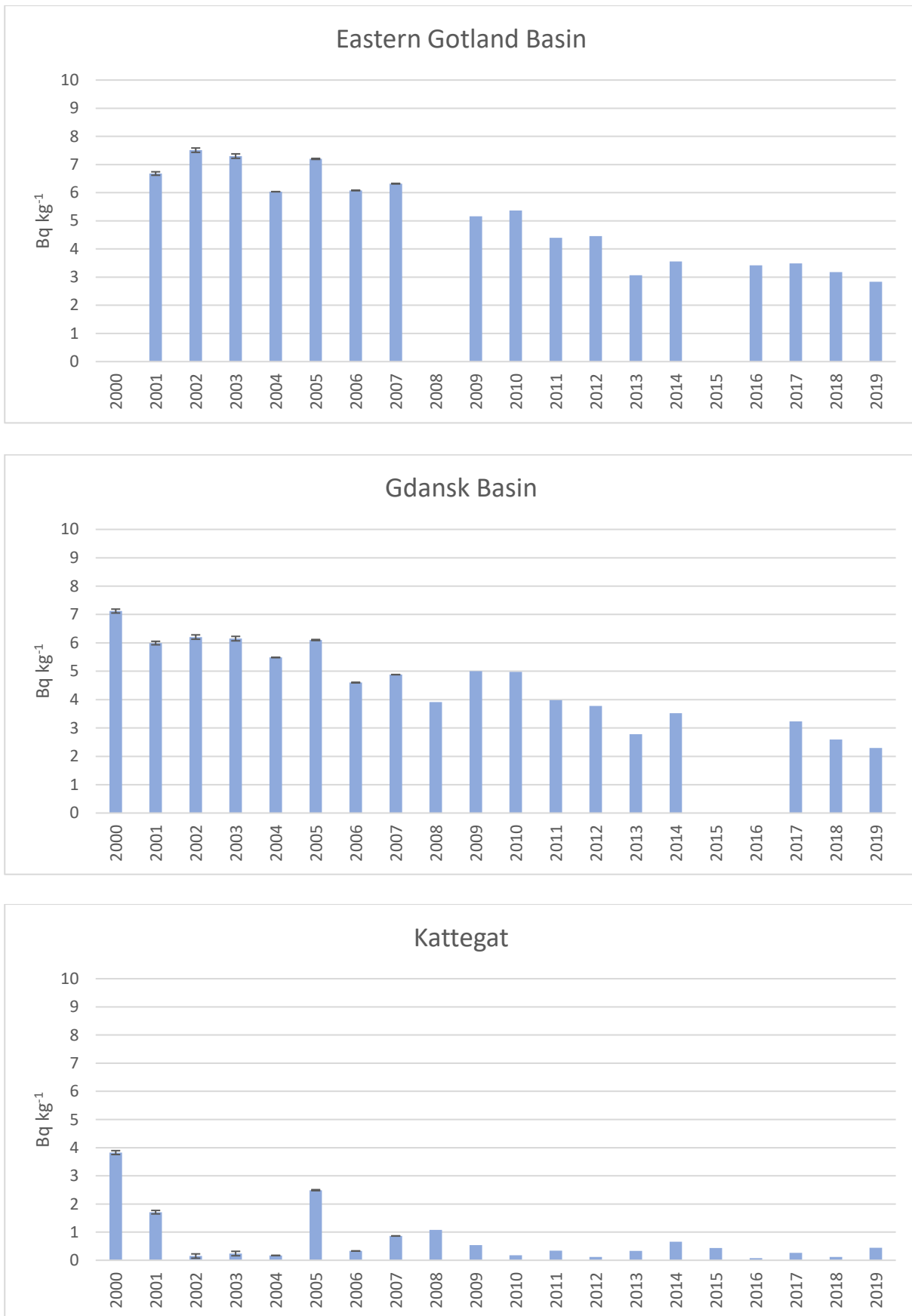
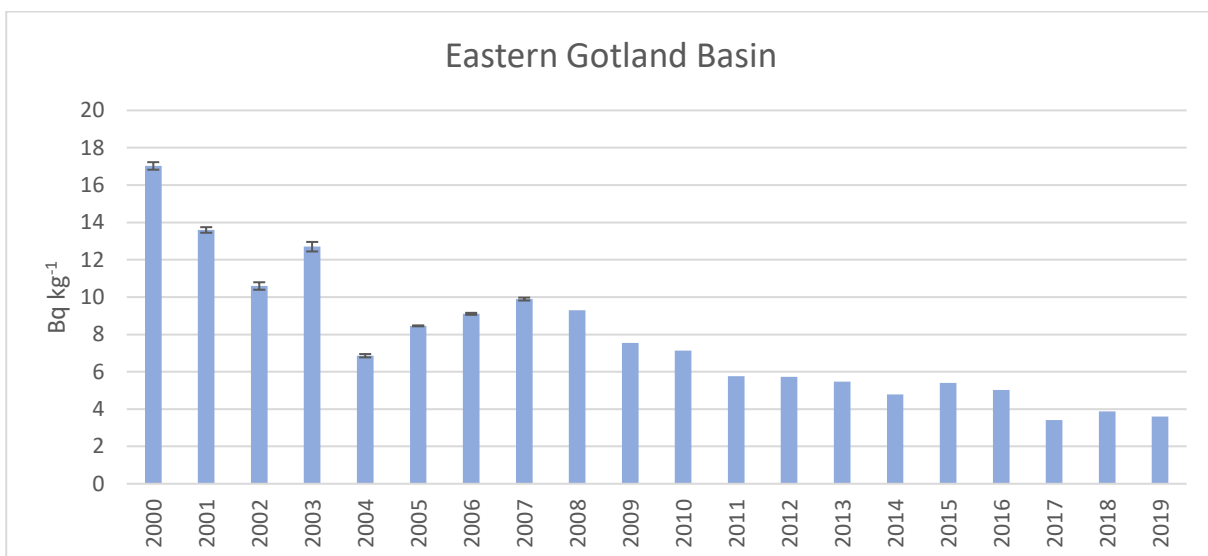
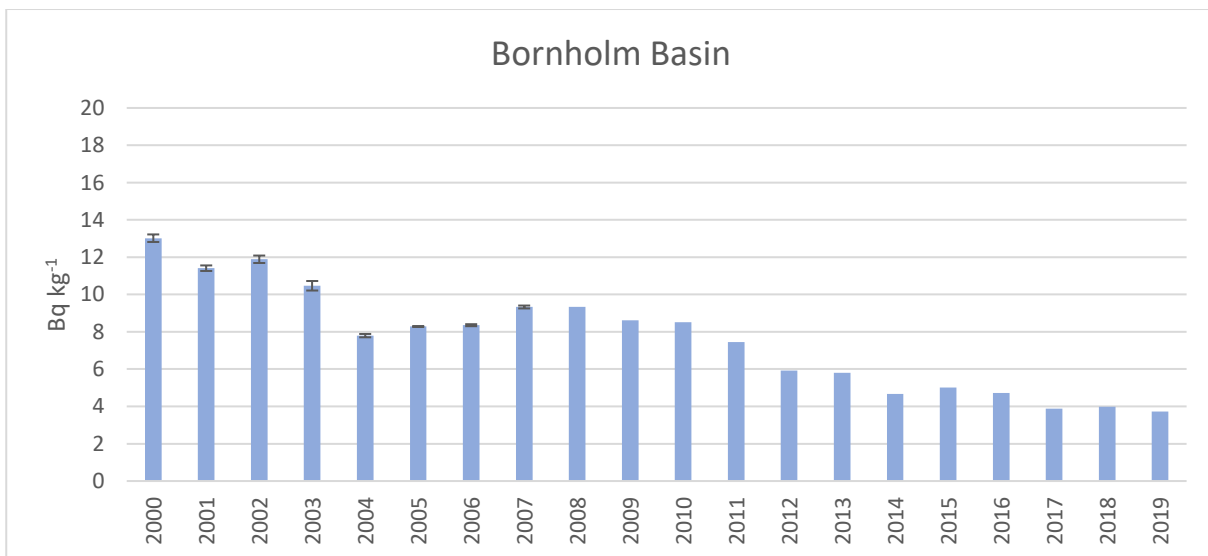
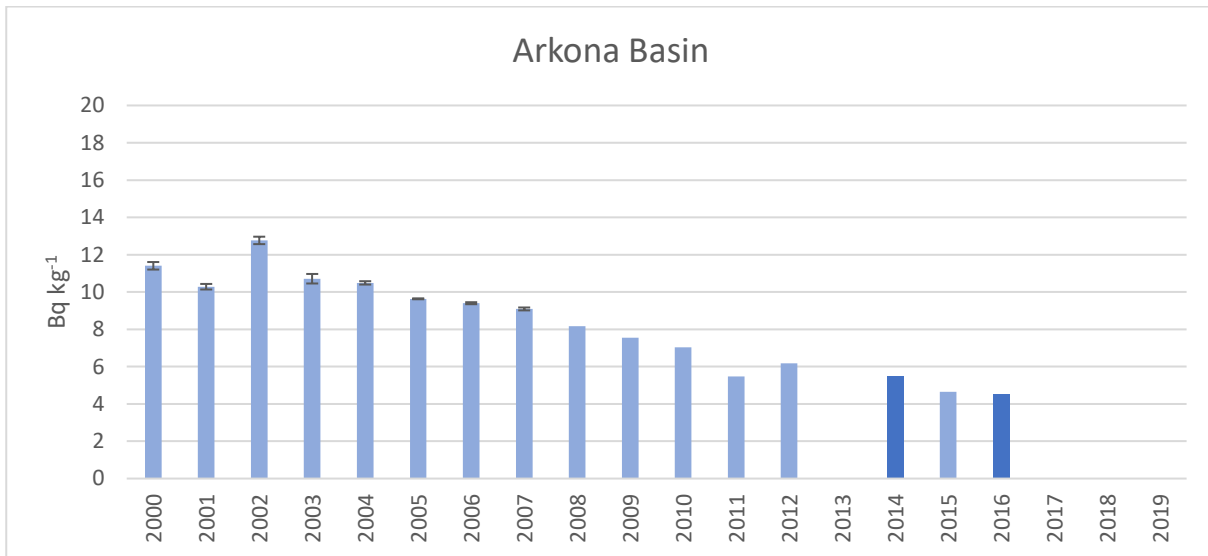


Figure 4. <sup>137</sup>Cs (Bq kg<sup>-1</sup> of wet weight) in plaice and flounder 2000-2019.

## COD



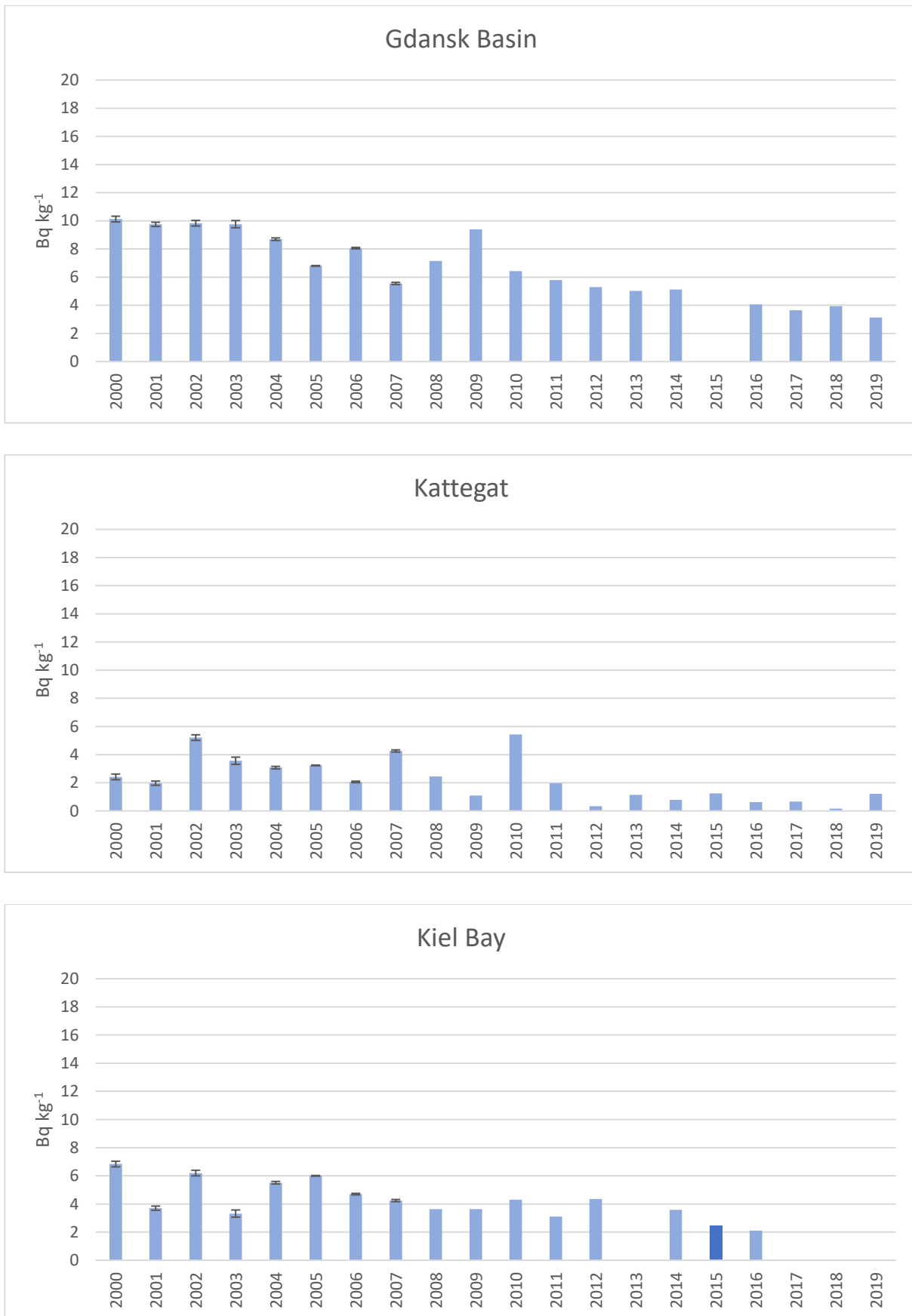
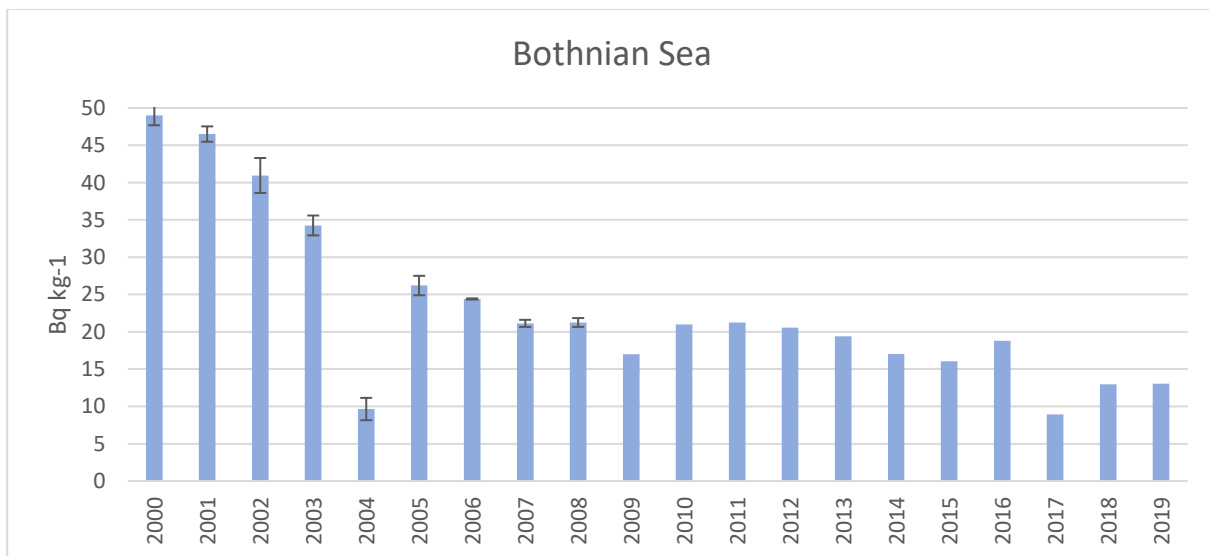
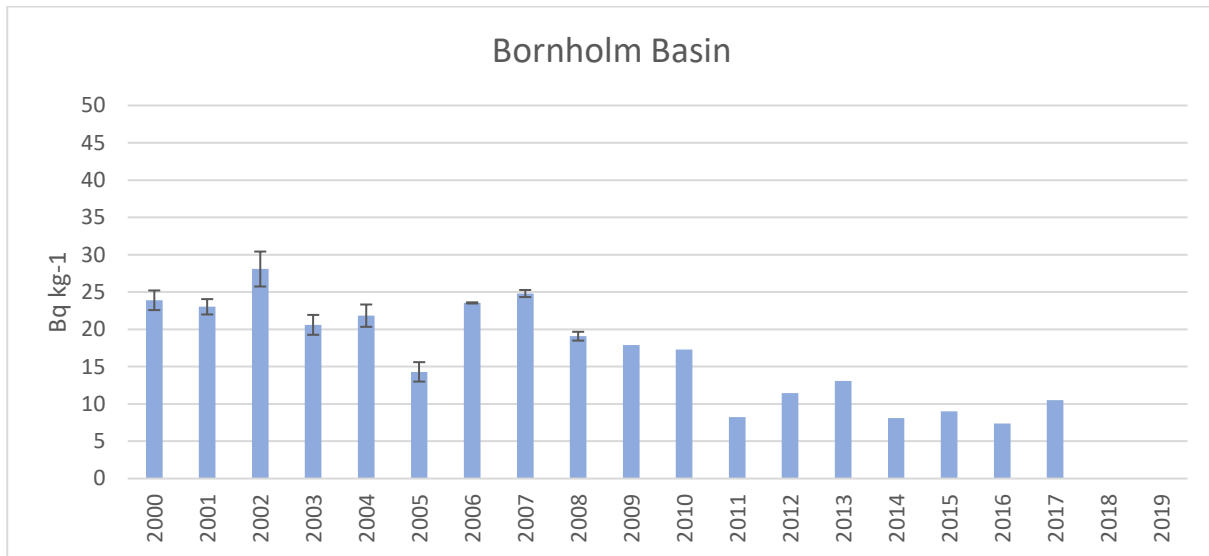


Figure 5.  $^{137}\text{Cs}$  (Bq kg $^{-1}$  of wet weight) in cod muscle (fillets) 2000-2019. Added records for previous years provided for this report are indicated in dark blue.

**BLADDER WRACK (FUCUS VESICULOSUS)**

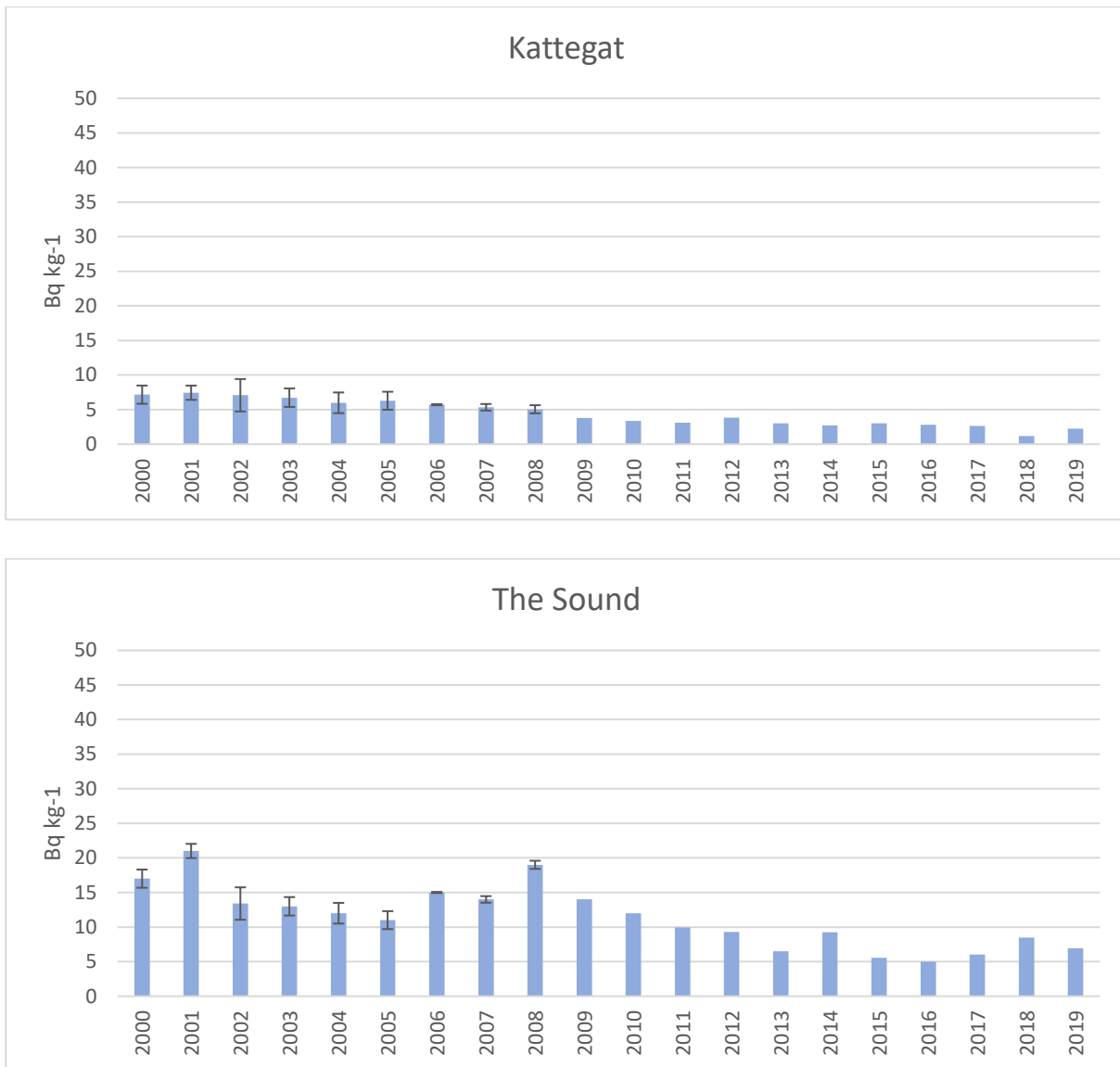
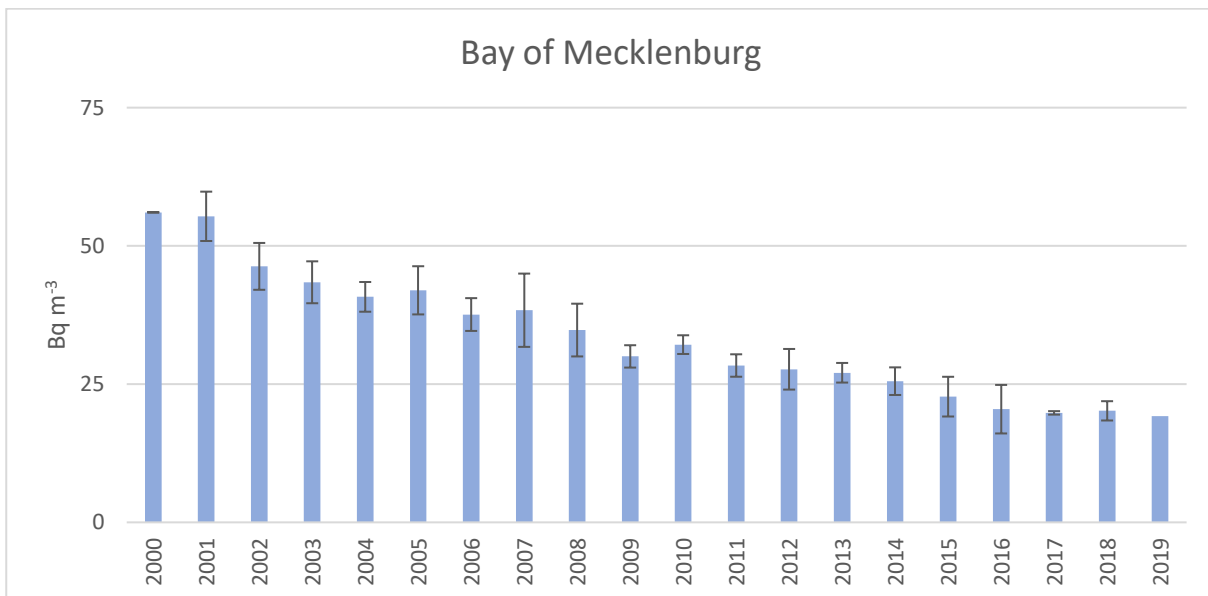
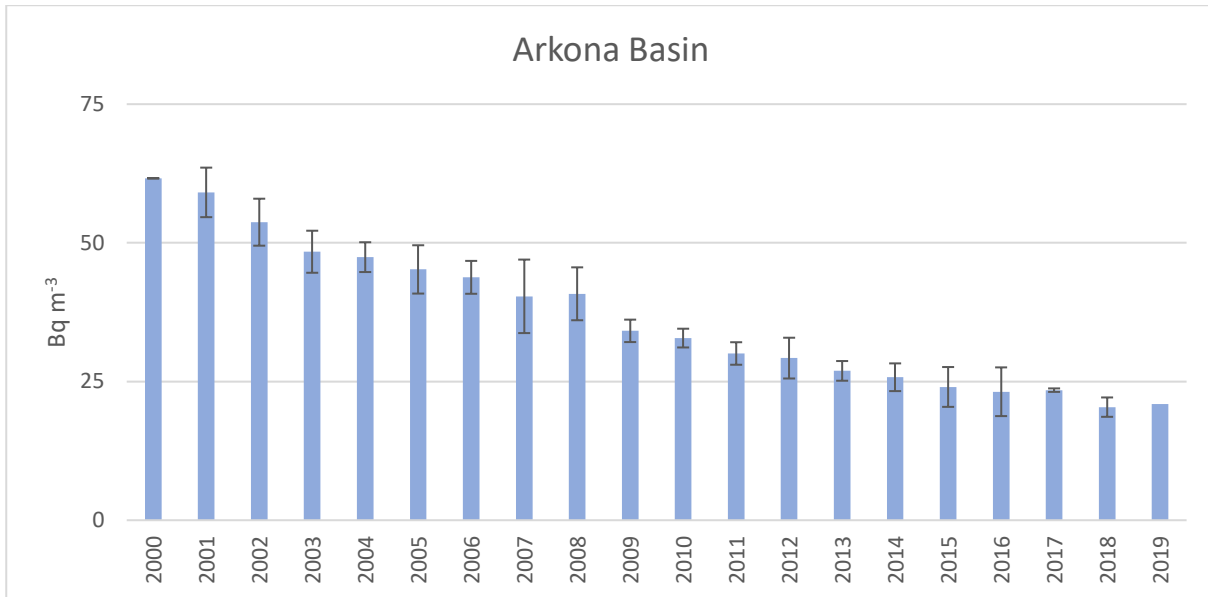
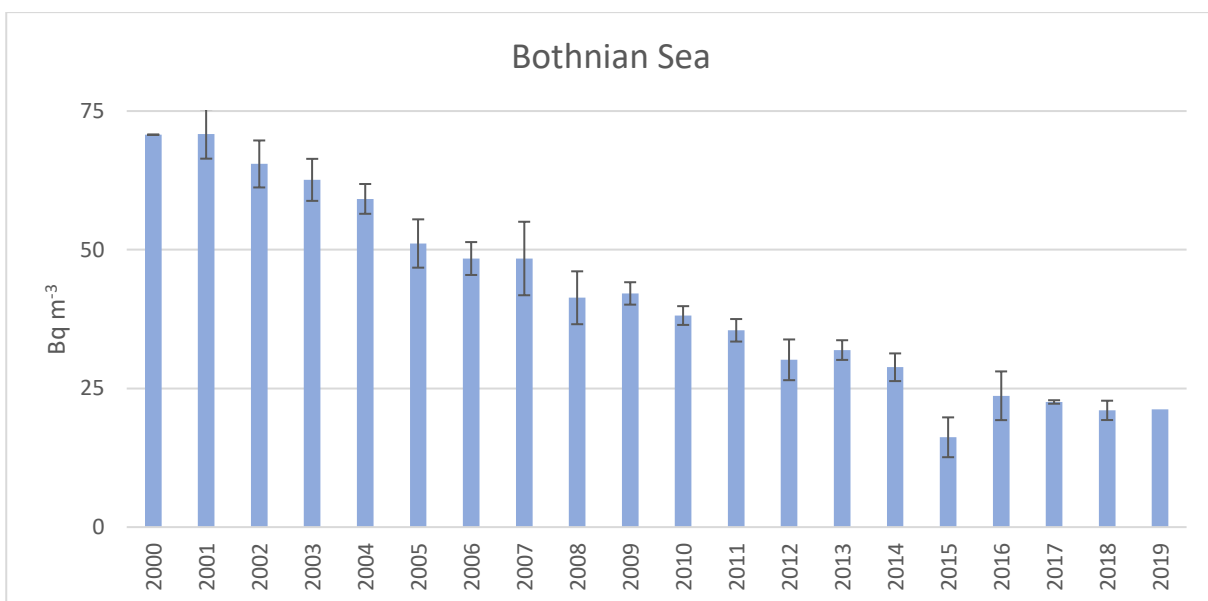
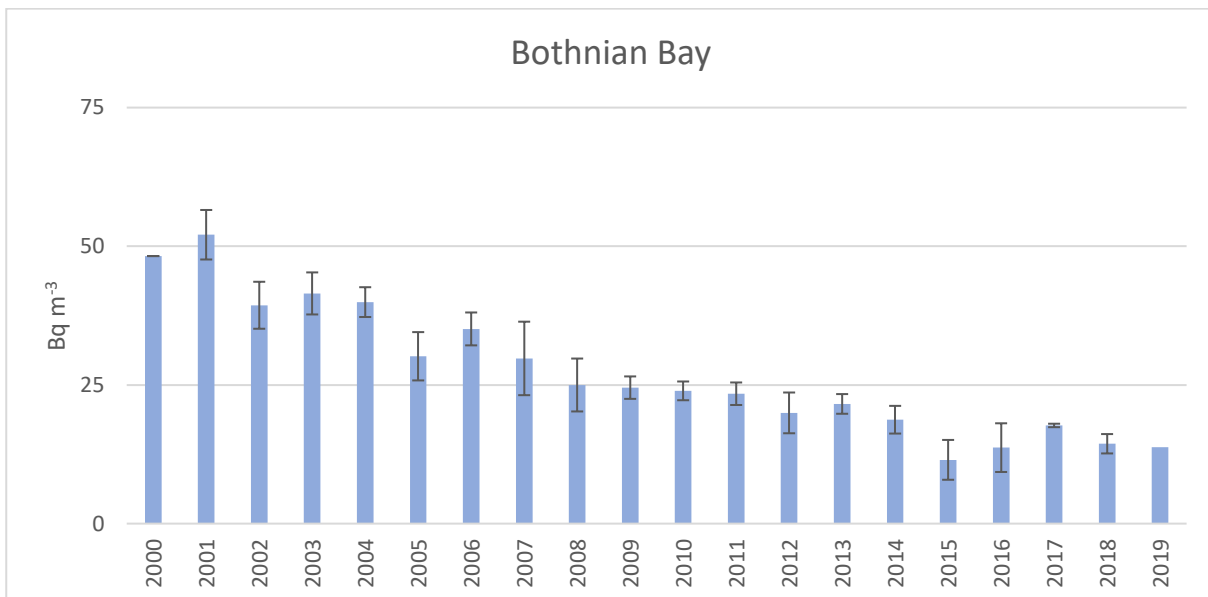
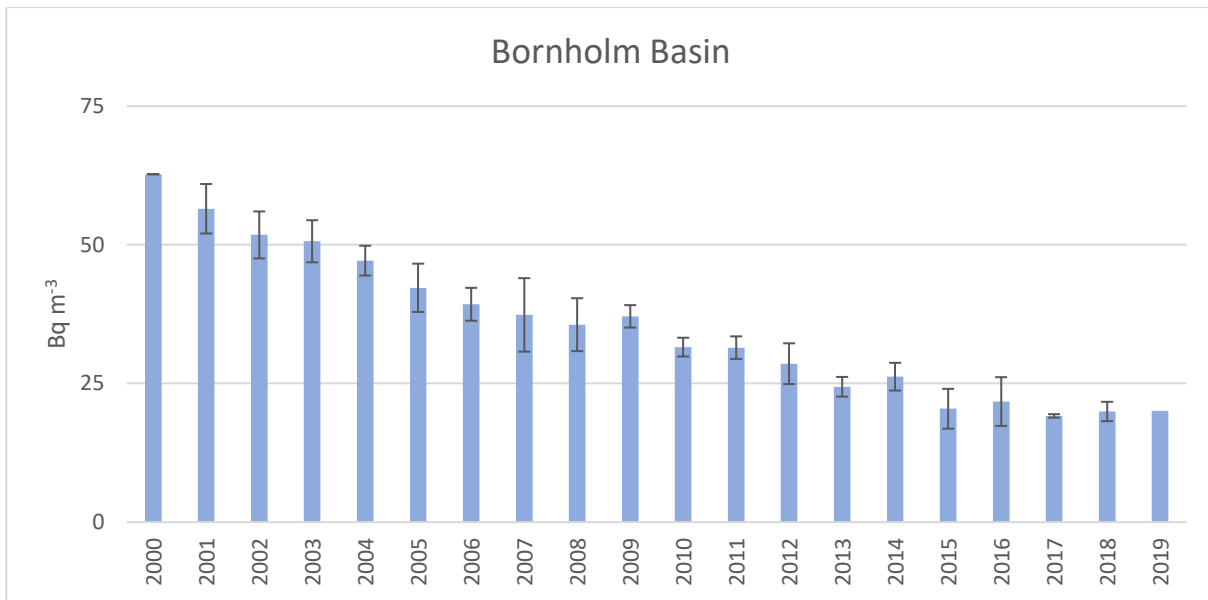
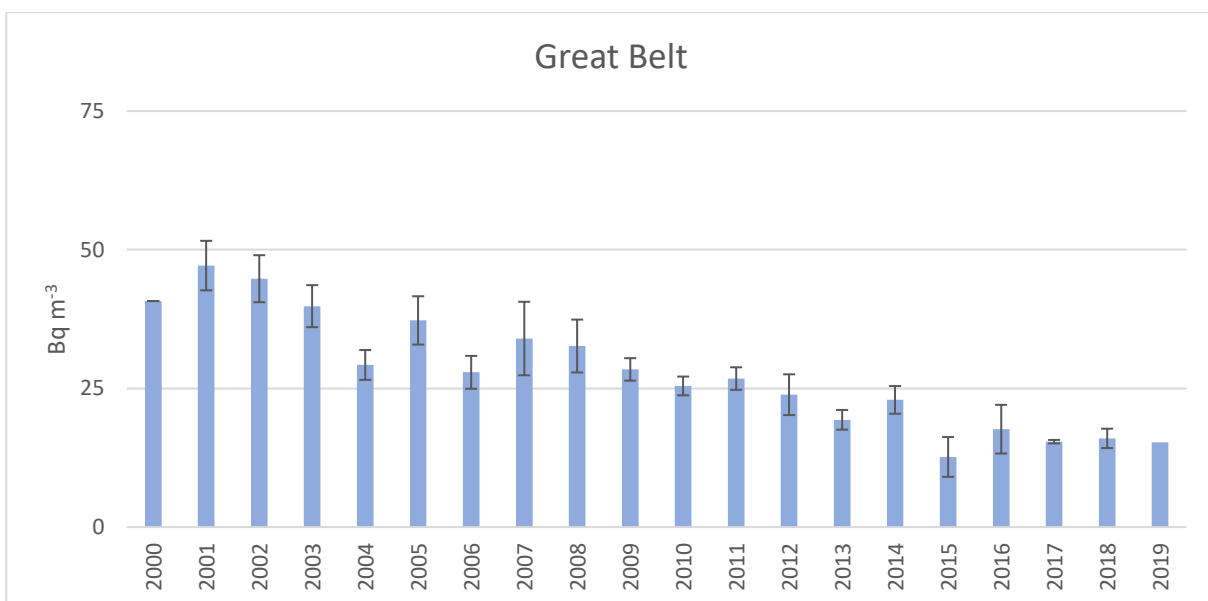
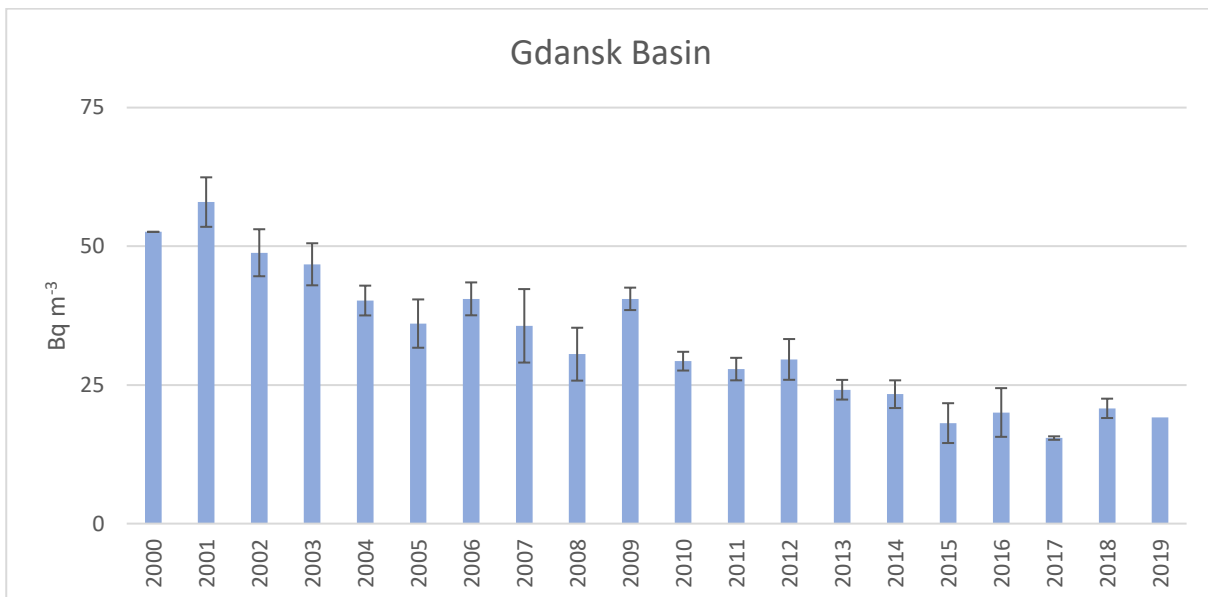
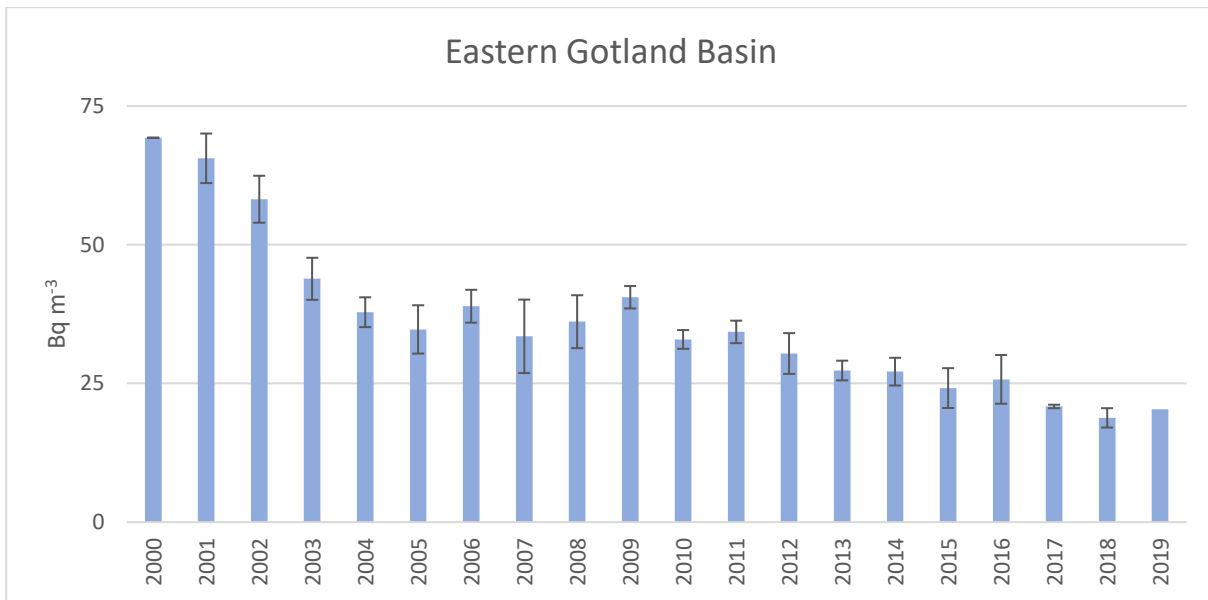


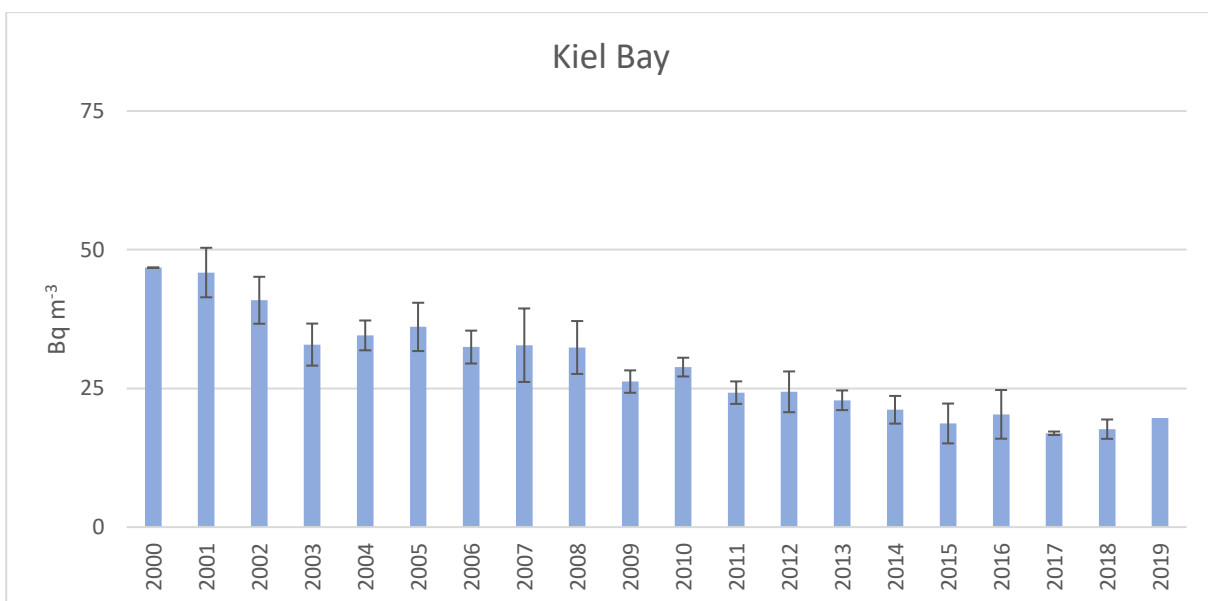
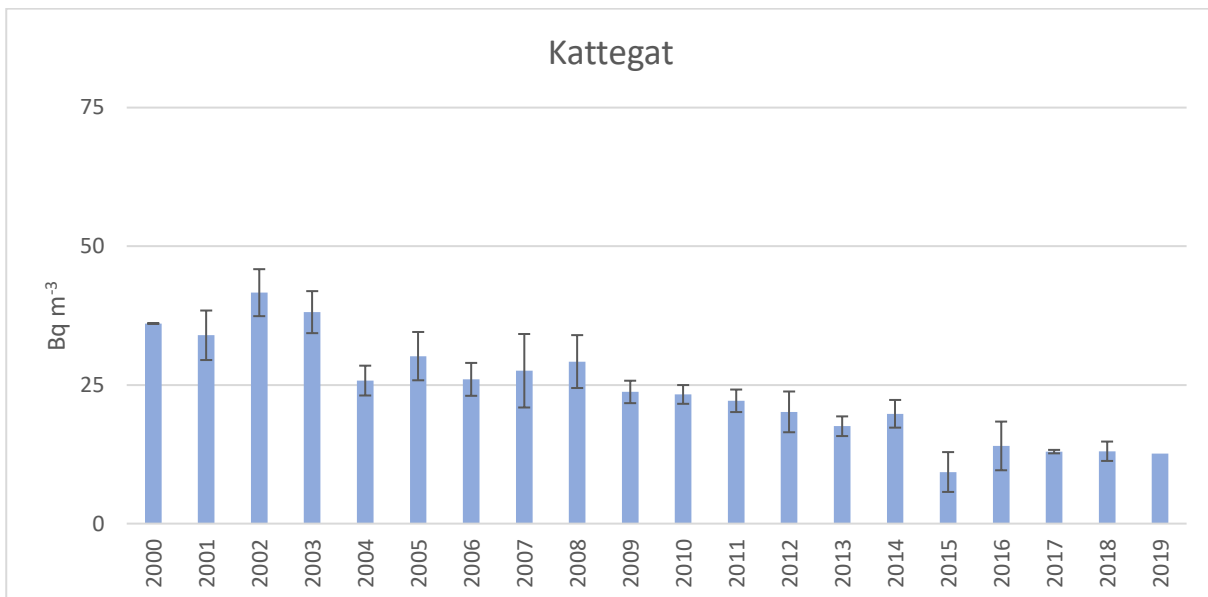
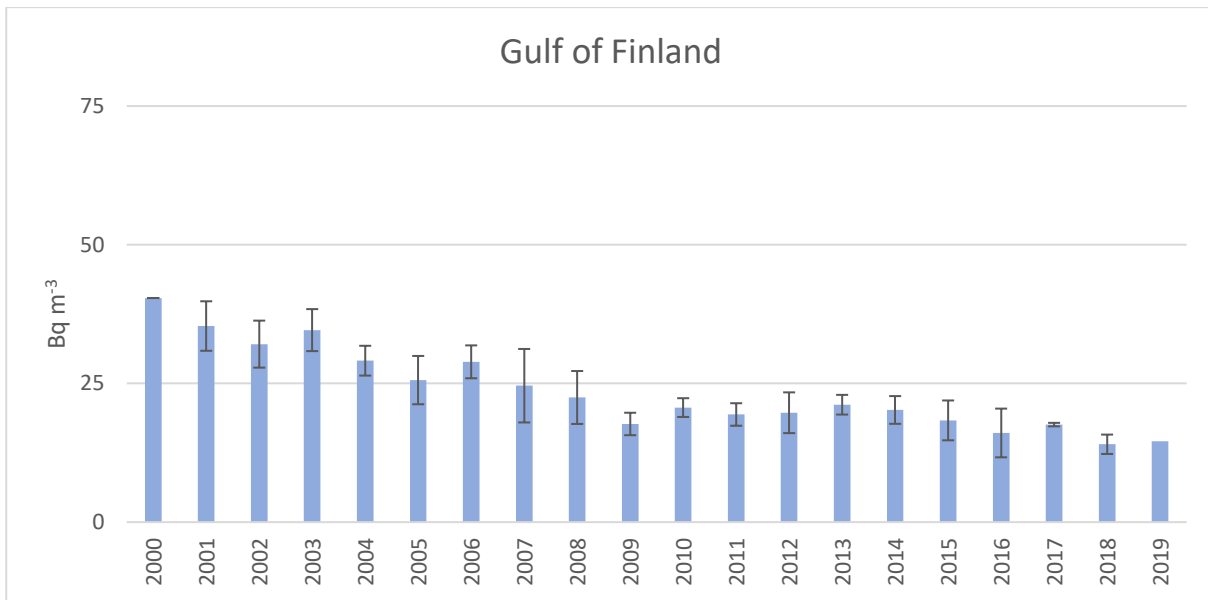
Figure 6.  $^{137}\text{Cs}$  (Bq kg<sup>-1</sup> of dry weight) in *Fucus vesiculosus* 2000-2019.



**SEAWATER  
SURFACE**







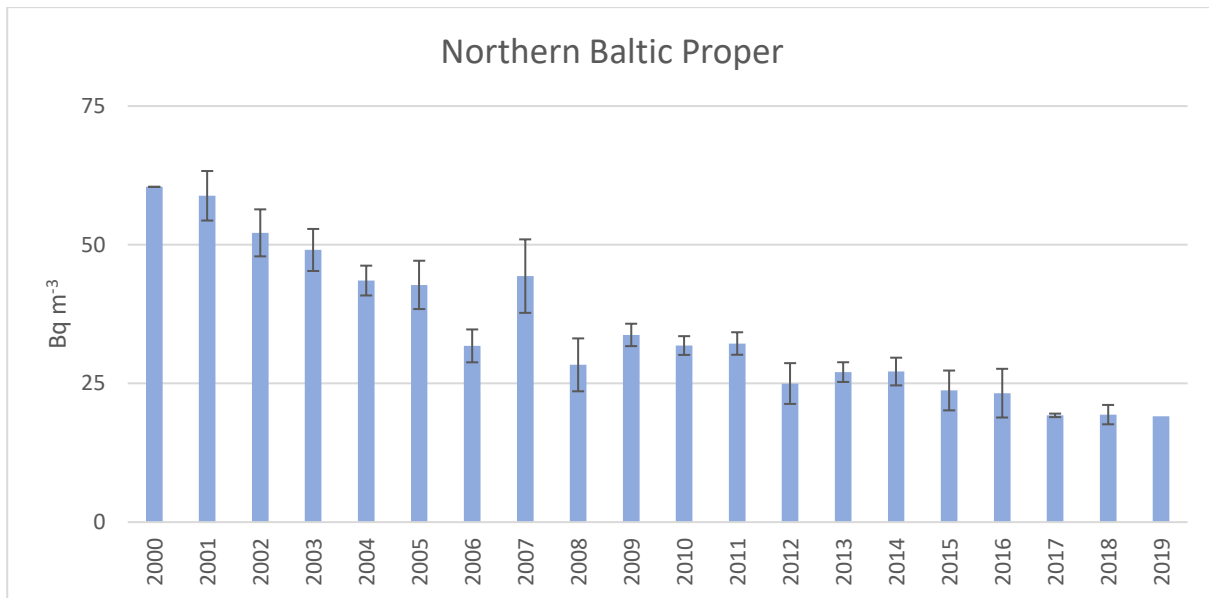
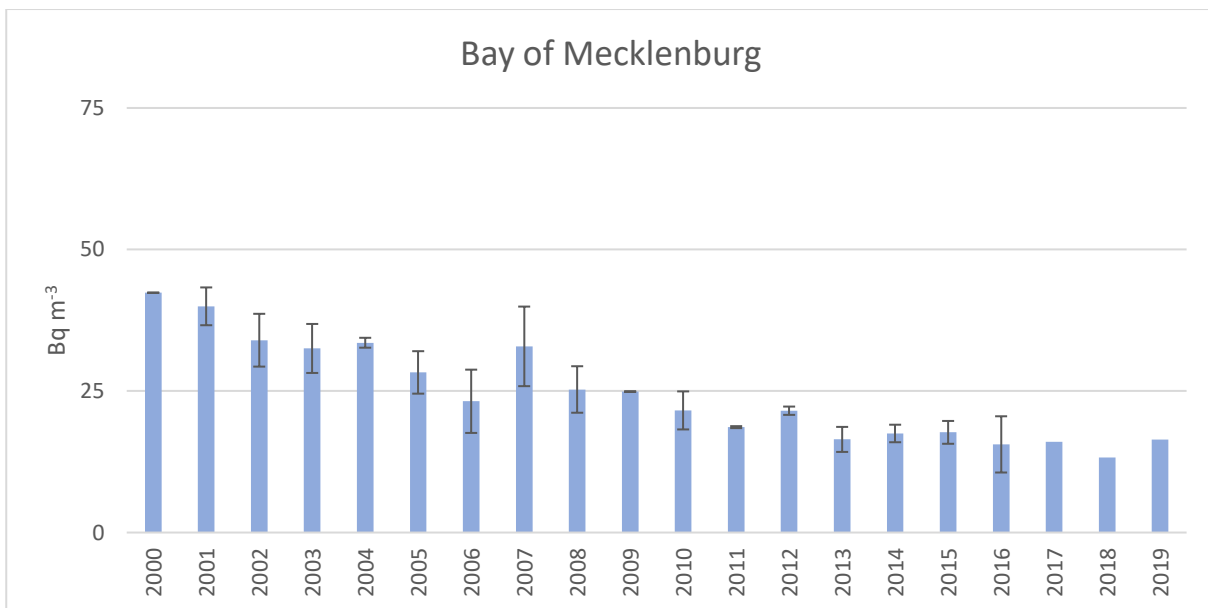
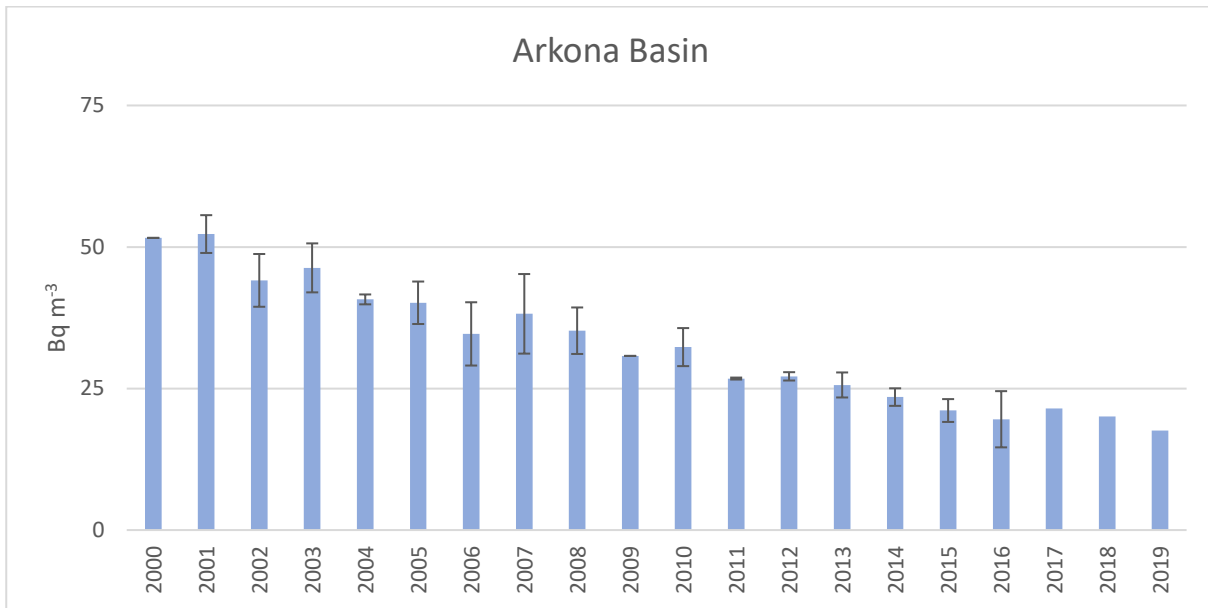
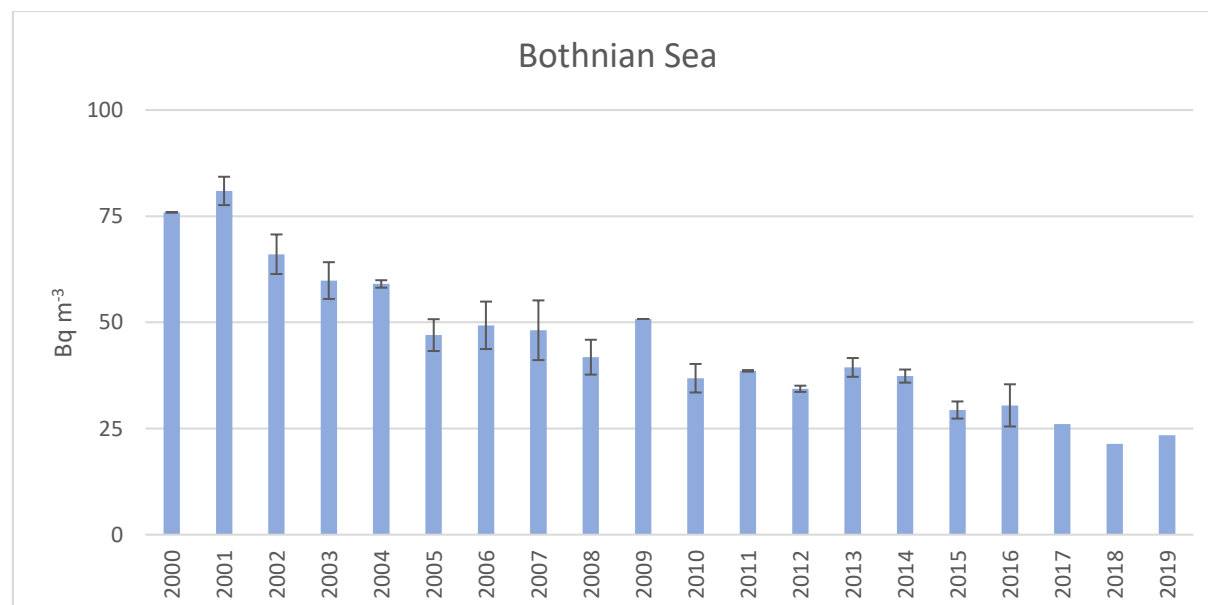
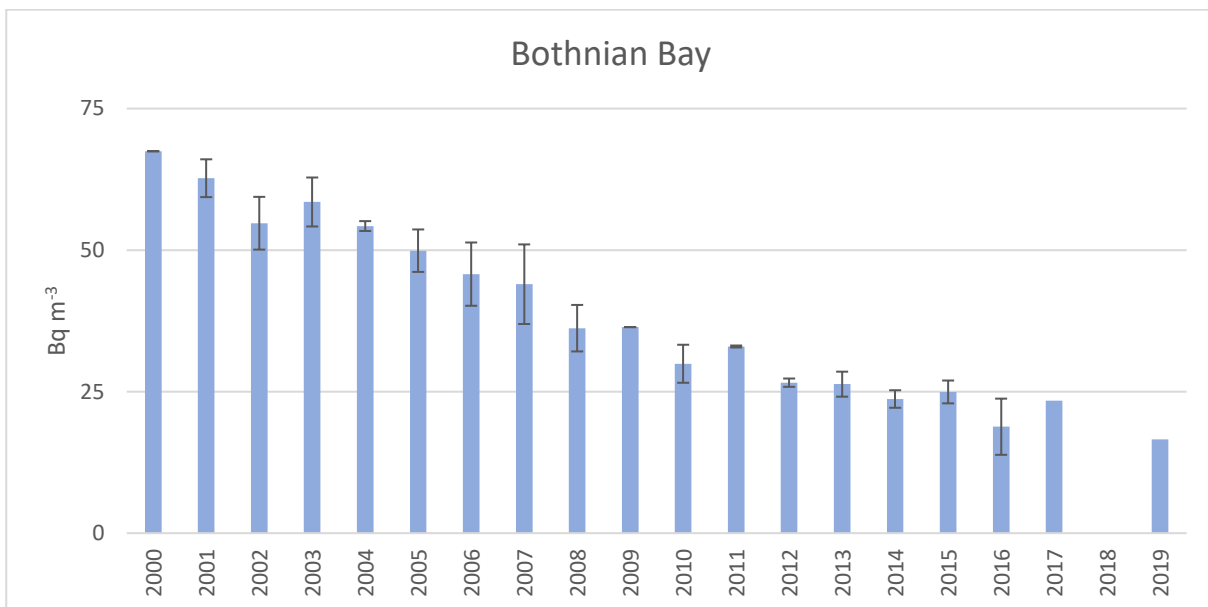
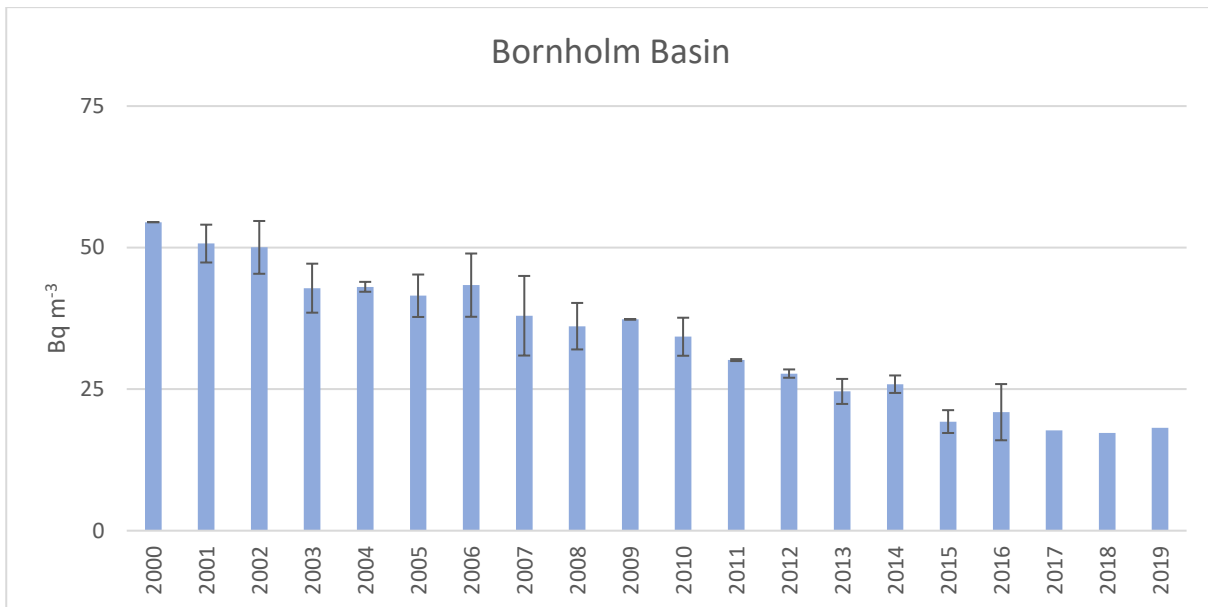
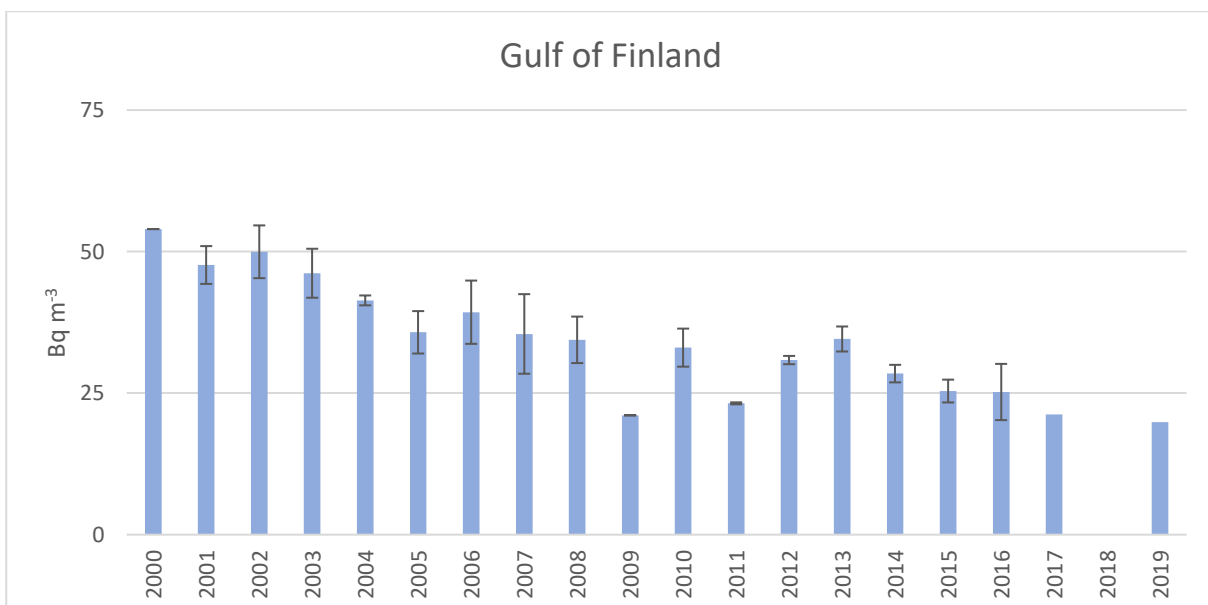
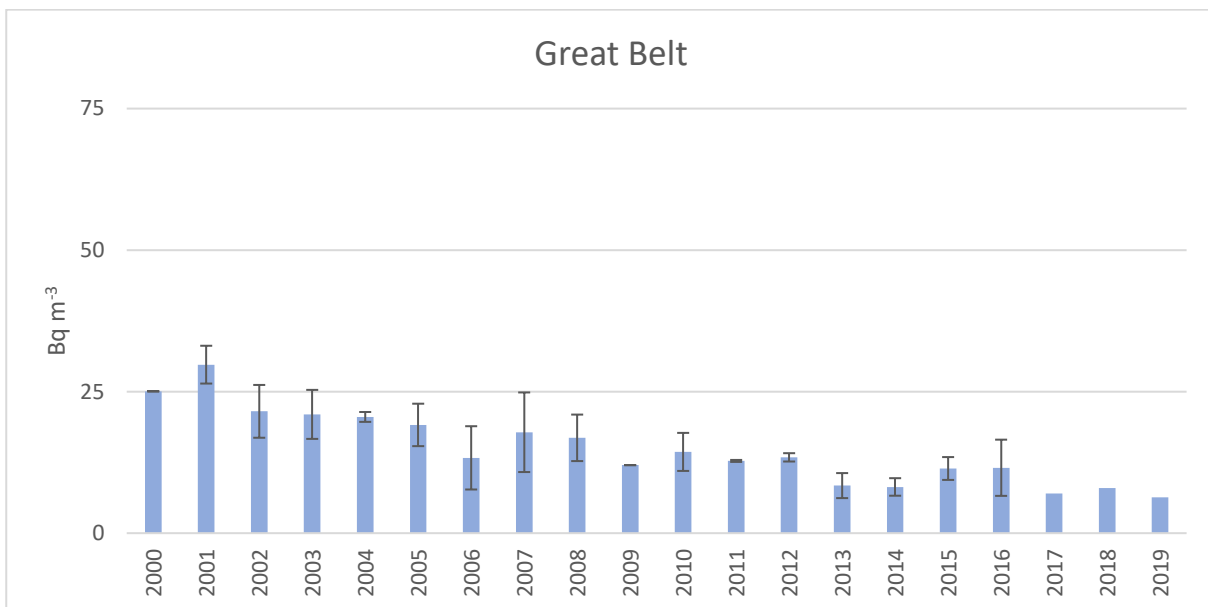
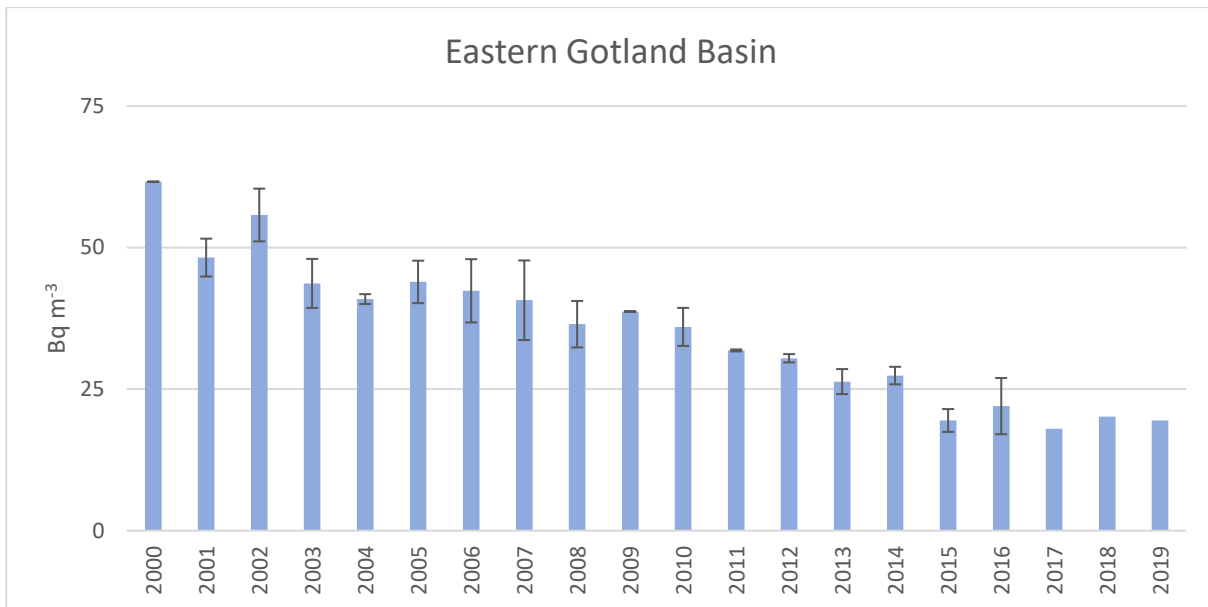


Figure 7.  $^{137}\text{Cs}$  ( $\text{Bq m}^{-3}$ ) in surface water 2000-2019.

## BOTTOM WATER









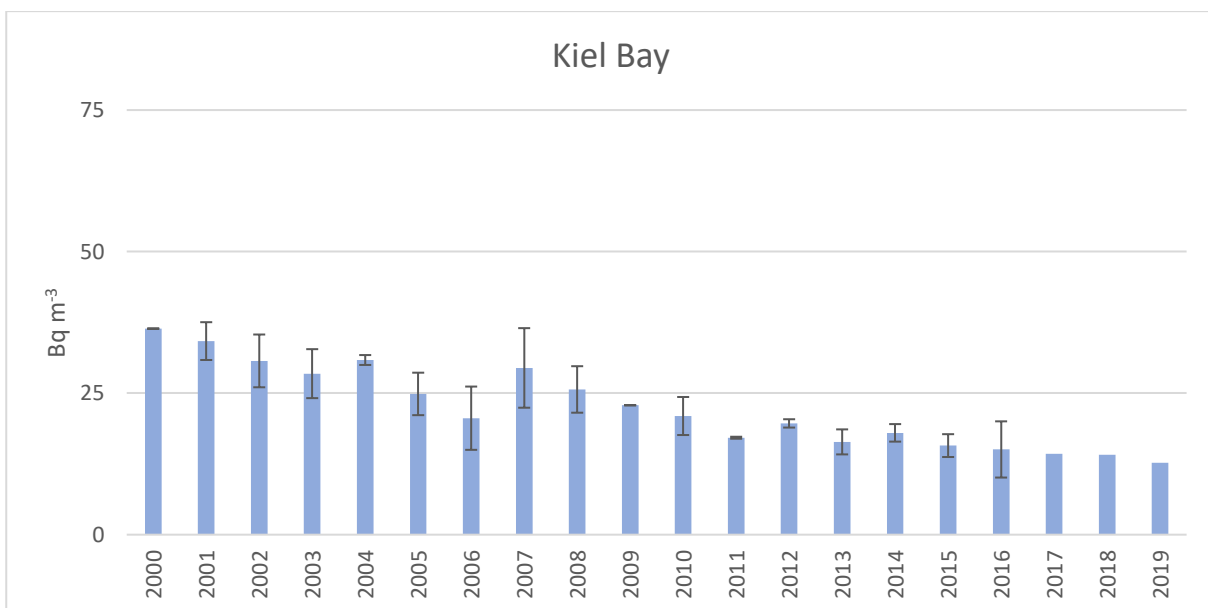
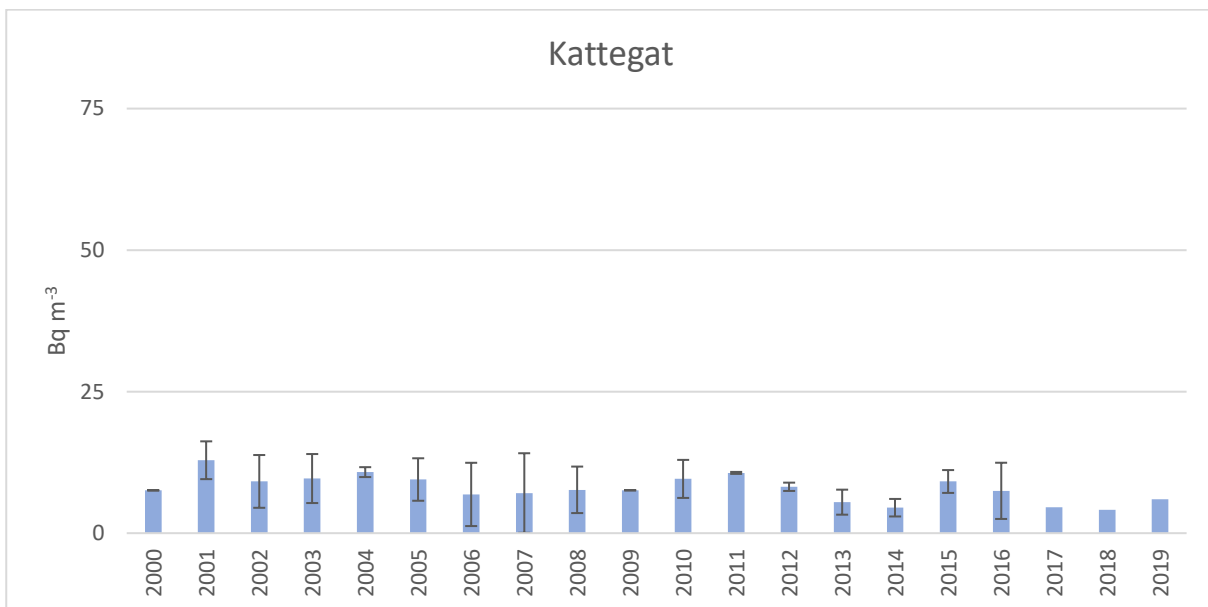
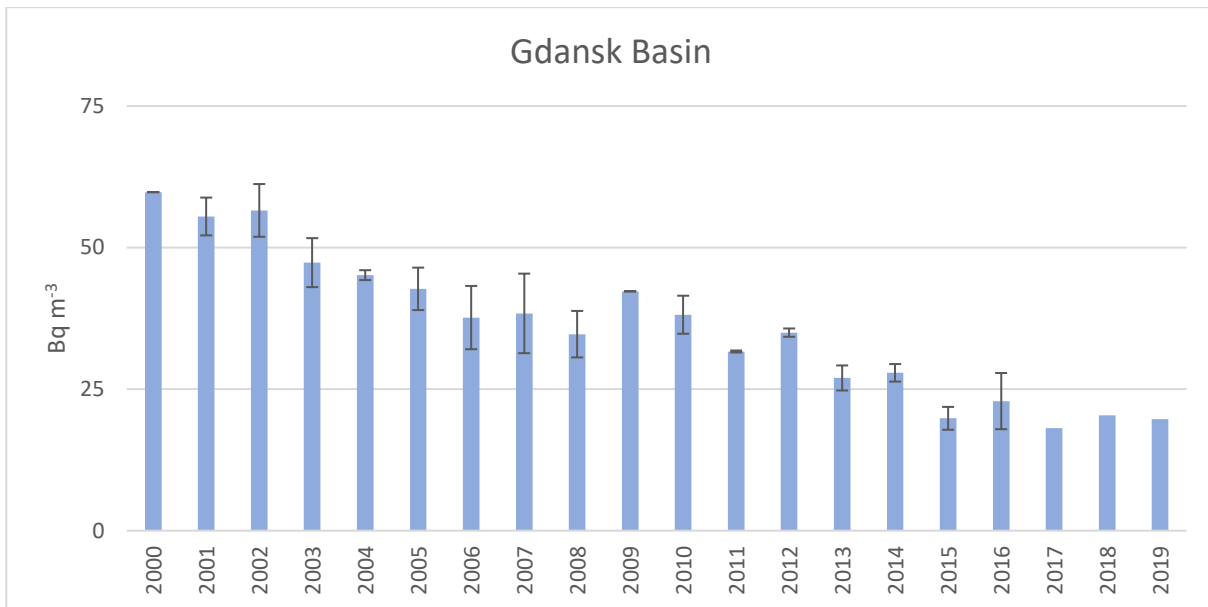
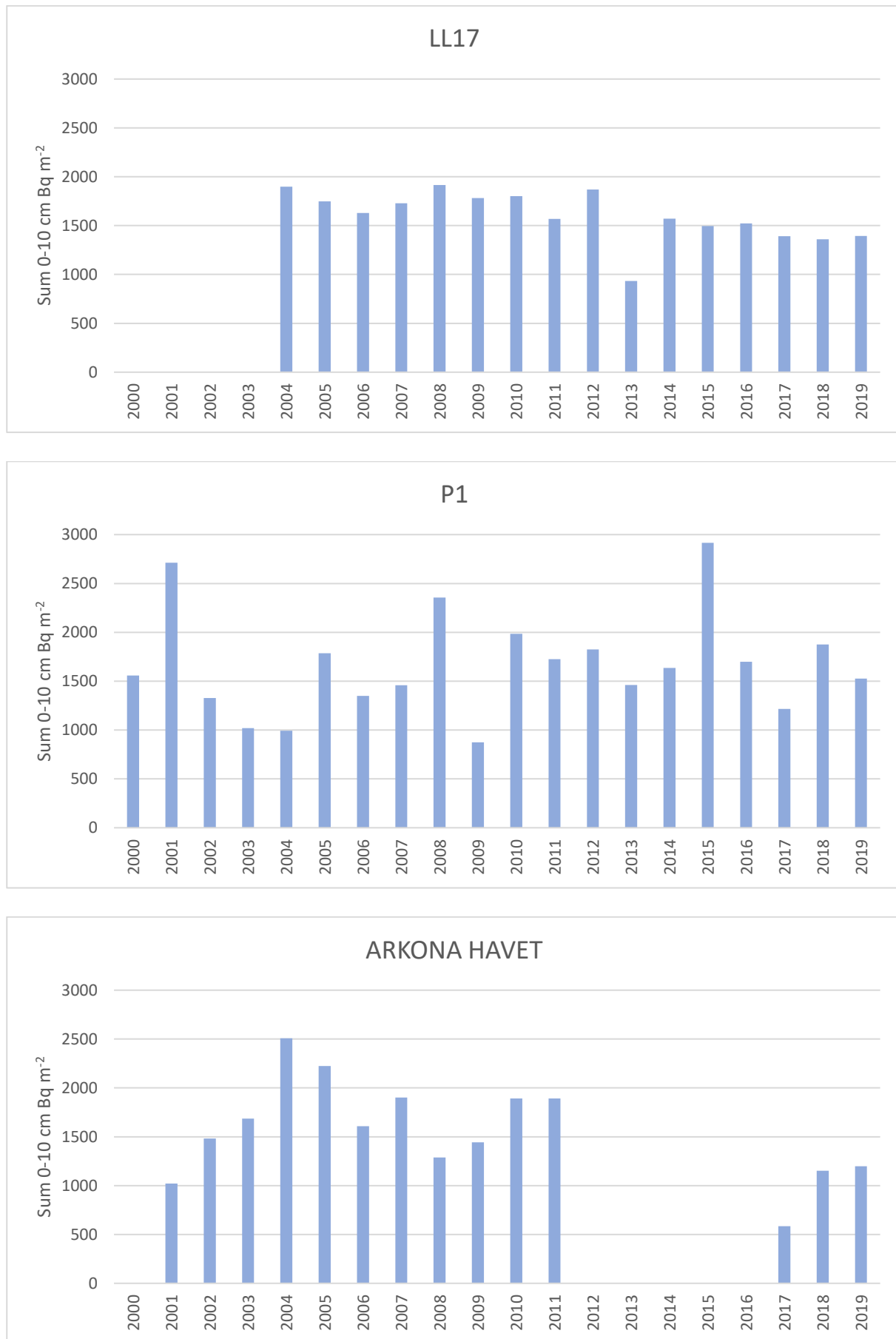


Figure 8.  $^{137}\text{Cs}$  ( $\text{Bq m}^{-3}$ ) in bottom water 2000-2019. Note variable scale in graphs.

## SEDIMENT

Figure 9. <sup>137</sup>Cs (Bq m<sup>-2</sup>) in surface sediment (0-10 cm) at 9 stations surface 2000-2019.