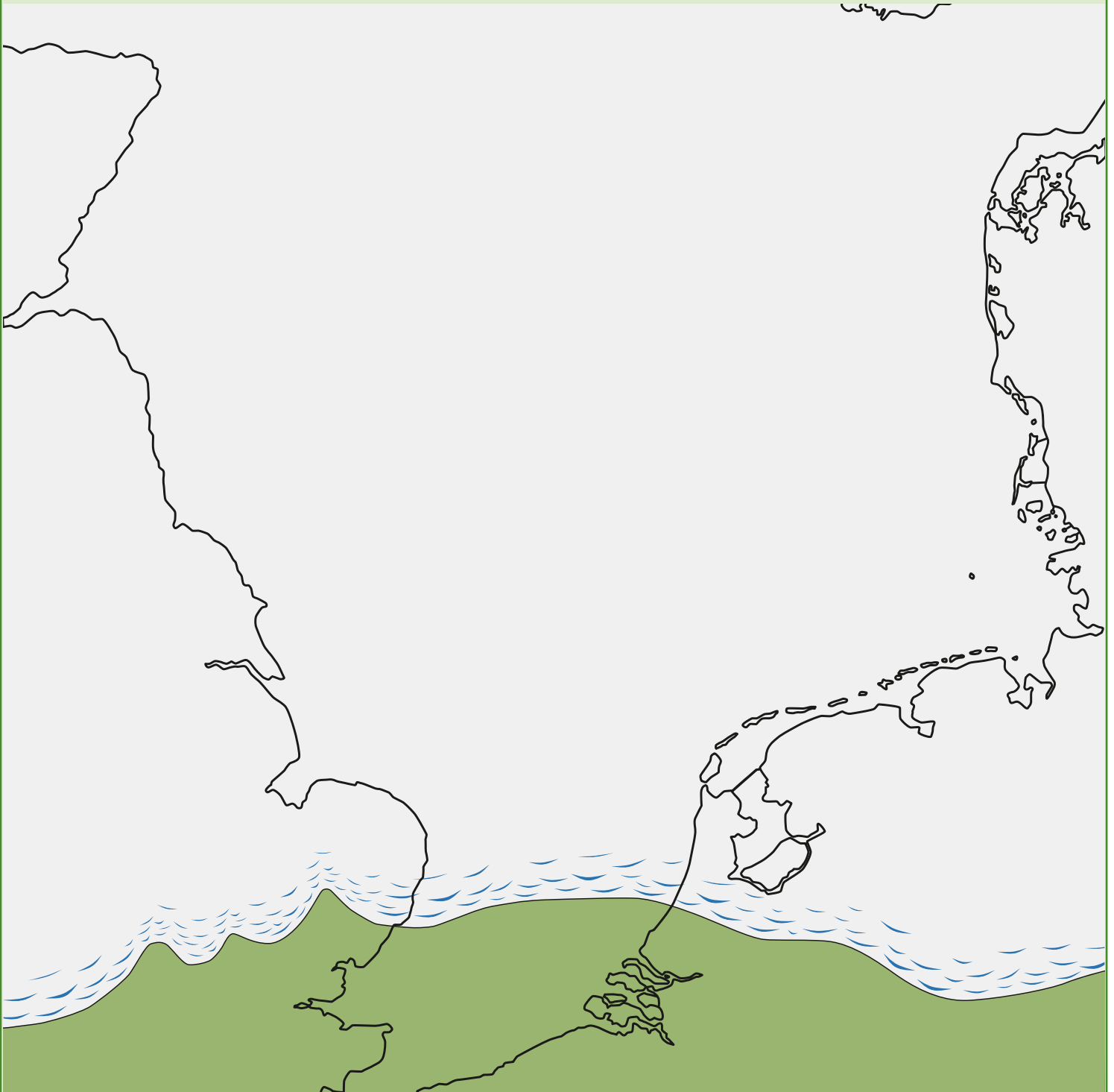
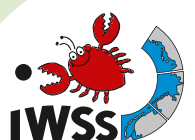


# The North Sea coastline



© International Wadden Sea School

[www.iwss.org](http://www.iwss.org)

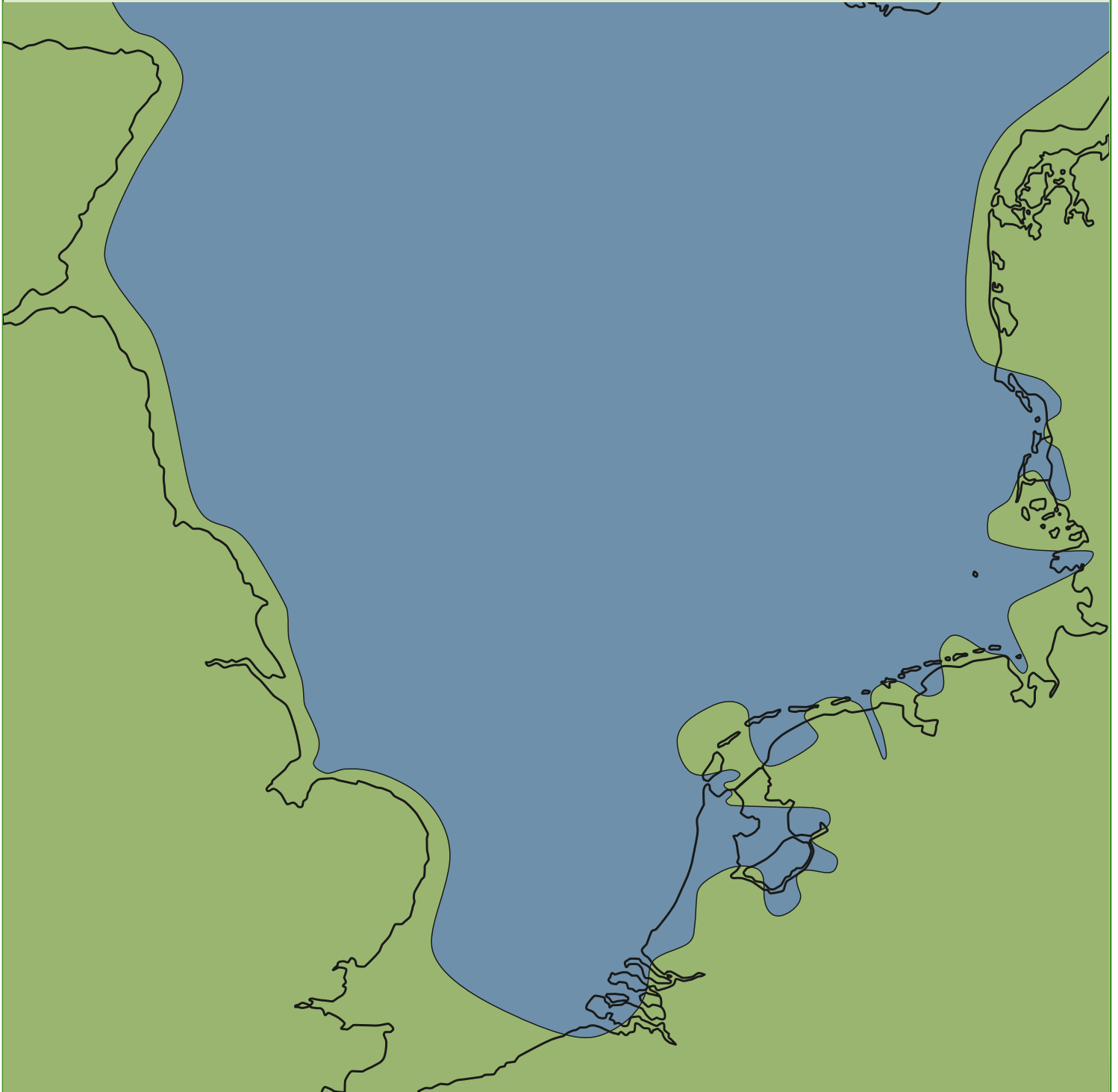


# The North Sea coastline

## 150,000 years ago

- About 150,000 years ago, the whole North Sea basin was covered with a thick layer of ice: it was the **Saale** or **Saalian ice age**.
- The entire North Sea water was bound frozen in glaciers.
- The ice also covered large parts of northern Germany. The glacier's southern border ran along a line between Düsseldorf, Hameln and Meissen.
- The Saale ice age lasted about 170,000 years from 300,000 years until 130,000 years before now. Then it slowly got warmer.

# The North Sea coastline



© International Wadden Sea School

[www.iwss.org](http://www.iwss.org)

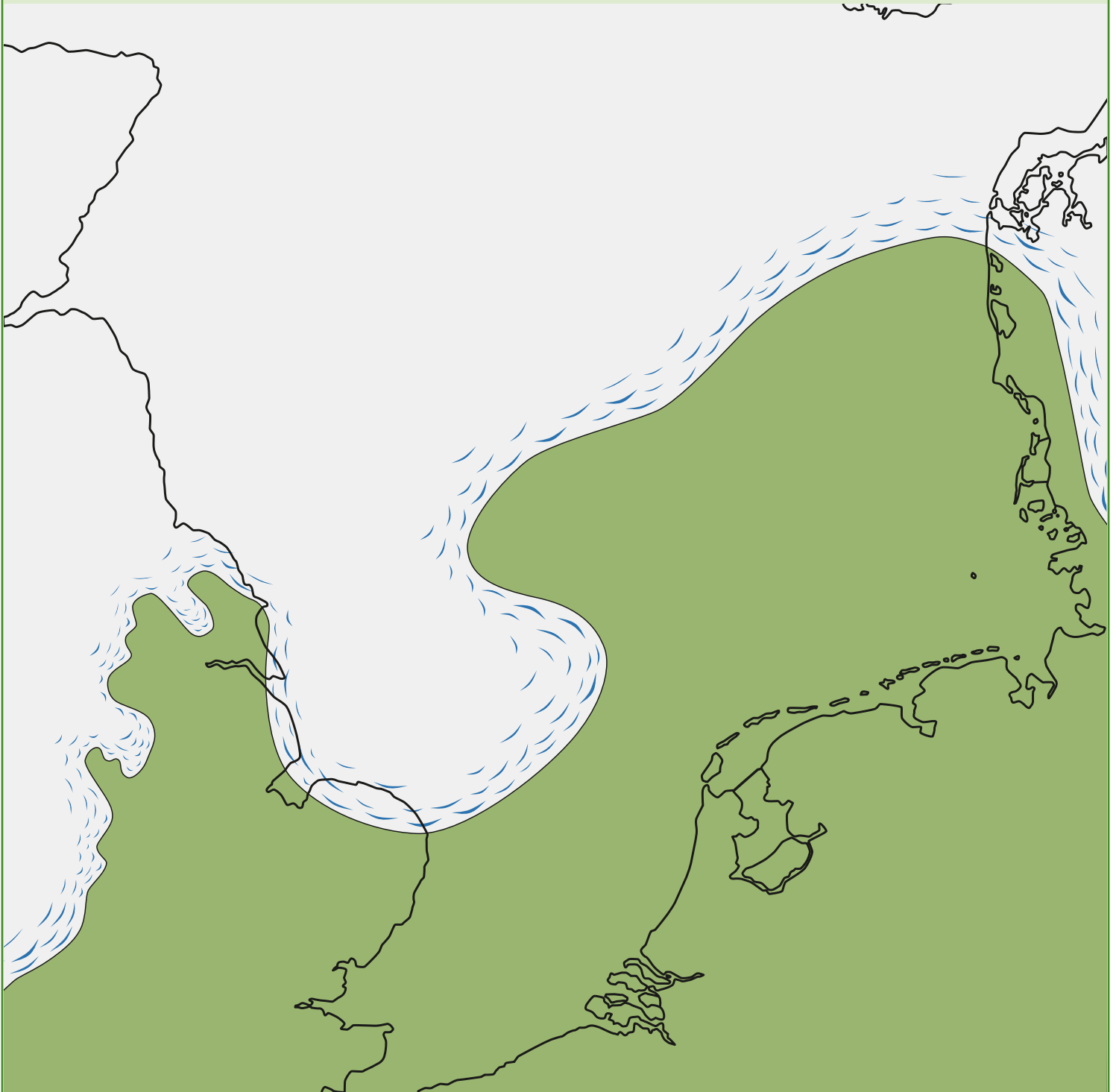


# The North Sea coastline

## 120,000 years ago

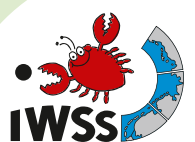
- The Saale ice age was followed by the **Eemian interglacial** warm period about 130,000 years ago.
- Temperatures rose, glaciers melted and water filled the North Sea basin.
- About 120,000 years ago, the coastline was quite similar to the present coastline.
- The Eemian interglacial warm period lasted only about 15,000 years until 115,000 years before today. Then it got colder again.

# The North Sea coastline



© International Wadden Sea School

[www.iwss.org](http://www.iwss.org)



# The North Sea coastline

45,000 years ago

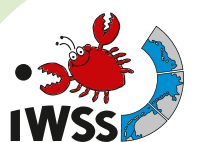
- The Eemian interglacial was followed by the **Weichselian ice age** from ca. 115,000 years before now.
- As in the Saale ice age, the North Sea water was bound frozen in glaciers. However, the Weichselian glaciers did not reach the present coast line in the Wadden Sea area.
- While sea levels dropped, large parts of the southern North Sea became part of the mainland. Mammoth, woolly rhinoceros and reindeer lived in the landscape between Denmark and England.
- The Weichselian ice age lasted until 12,000 years before today.

# The North Sea coastline



© International Wadden Sea School

[www.iwss.org](http://www.iwss.org)



# The North Sea coastline

## 12,000 years ago

- At the end of the Weichselian ice age about 12,000 years ago, the sea level was nearly 100 m below today's level.
- With melting glaciers, the water level rose worldwide and from the Atlantic Ocean seawater reached the northern North Sea.
- From the south, the rivers Elbe, Weser, Ems and Rhein flowed into the North Sea basin.
- The temperatures got milder and peat bogs developed. Parts of this peat can still be found on the coast today.

# The North Sea coastline



© International Wadden Sea School

[www.iwss.org](http://www.iwss.org)



# The North Sea coastline

## 9,000 years ago

- The melting of the ice age glaciers lead to a quick rise in sea level. When the level had reached 40 m below today's level, the water also flooded the North Sea from the south via the English Channel.
- Since then, two waves of tides daily flow into the North Sea: one from the north and one from the southwest.
- Together with continuously rising sea levels these currents had a major effect on the further development of the coast.

# The North Sea coastline



© International Wadden Sea School

[www.iwss.org](http://www.iwss.org)



# The North Sea coastline

## 6,000 years ago

- About 6,000 years ago the sea level was only 5 m below the current level.
- The forces of the two tidal waves from north and southwest created a "bulldozer"-effect:
  - Sand from the North Sea was moved towards the coast and formed a long line of sandbanks - ancestors of today's islands.
  - Between these sandbanks and the mainland, where the current was warded off, peat bogs developed that were later flooded by sea water and turned into mudflats.

# The North Sea coastline



© International Wadden Sea School

[www.iwss.org](http://www.iwss.org)



# The North Sea coastline

## 1,500 years ago

- With still rising sea levels the sandbanks continued to move further towards the coast.
- 1,500 years ago the sea level rise stopped and the sandbanks came to a halt where since then the Frisian islands (North, East and West) are situated.
- Behind the sandbanks extensive mudflats developed. Several tidal areas formed large bays reaching far into today's mainland.

# The North Frisian coastline



© Hansen und Hansen

[www.iwss.org](http://www.iwss.org)



# The North Frisian coastline

## 700 years ago

- On the North Frisian coast a vast landscape of peat bogs and marshes had developed in the shadow of the sandbanks. Tidal channels divided the land into numerous smaller and larger islands.
- The landscape was densely populated: churches and houses were built on dwelling mounds. Low dikes protected the cattle on the meadows and facilitated agriculture and the extraction of peat for obtaining salt.
- The drainage of the marsh and the extraction of peat lowered the areas within the dikes compared to the mudflats outside the dikes.
- The "First Great Drowning of Men" - a severe storm surge in 1362 - flooded large parts of the former marsh. In North Frisia more than 40 churches were destroyed and thousands of people died in the floodwaters.

# The North Frisian coastline



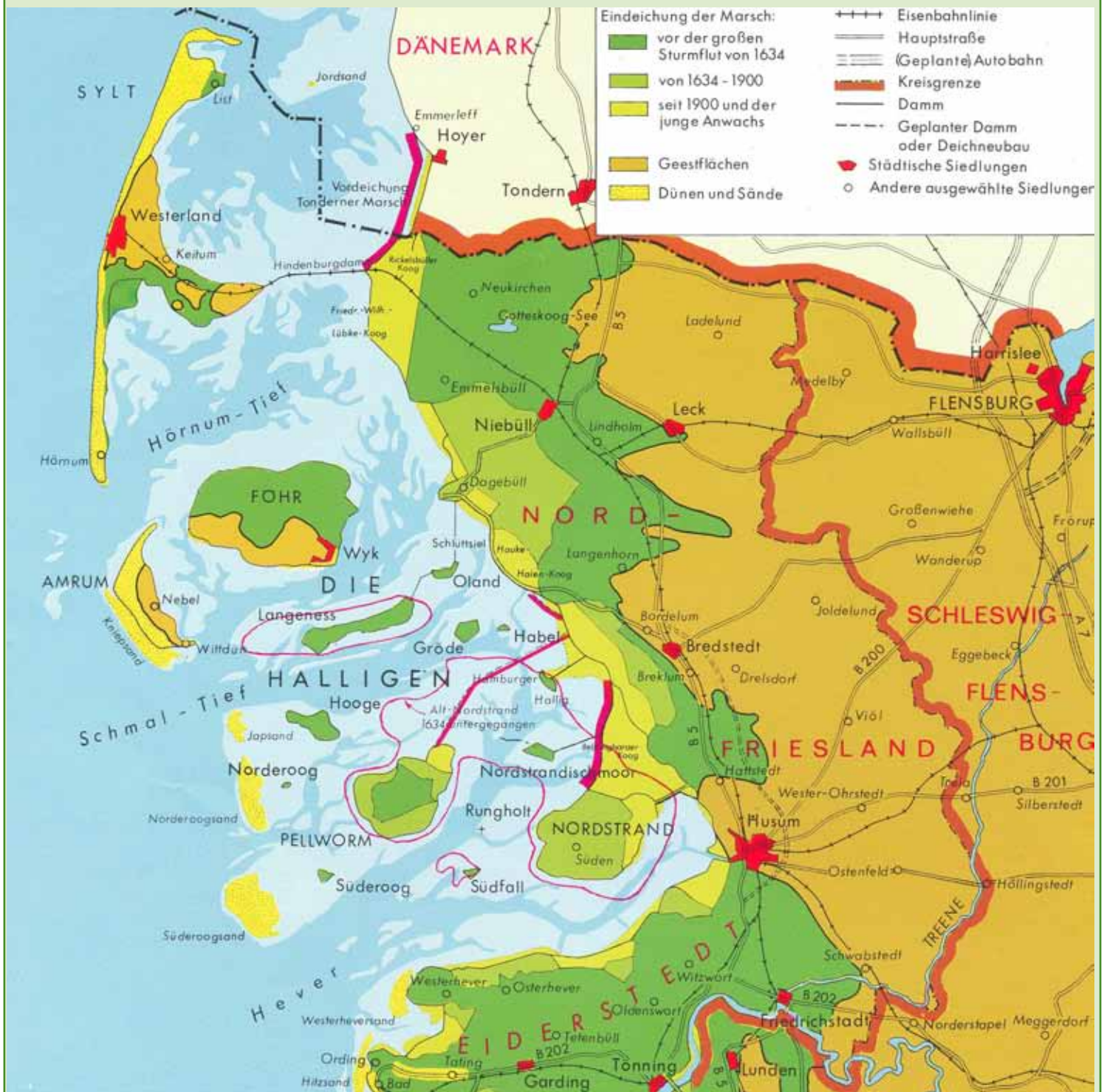
© Hansen und Hansen

# The North Frisian coastline

## 400 years ago

- After the "First Great Drowning of Men" the coastal landscape became a world of islands and hallig islands with extensive tidal flats.
- Besides the larger islands of Sylt, Amrum, Föhr and Strand there were numerous hallig islands, that were, subject to erosion.
- From the former broad marshland area today's coastline is already visible.
- The "Second Great Drowning of Men" in 1634 destroyed many dikes and the arable land behind them. Several thousand people died and more than 50.000 farm animals drowned.

# The North Frisian coastline



© Hansen und Hansen

# The North Frisian coastline since 1992

- After the "Second Great Drowning of Men" parts of the flooded land were reclaimed by new dikes.
- Today the islands of Pellworm and Nordstrand are the remnants of the island Strand that was destroyed in 1634.
- During the course of the 20th century land reclamation moved the coastline further out onto the former mudflats.
- After 1000 years of dike building history, today's dikes are the highest ever but have such a wide dike base that they have gentle slopes which withstand storm surges. Climate change, however, now intensifies the rate of sea level rise to more than 5 mm per year.