

Coastal risk in the Bristol Channel: a meteorological perspective

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Introduction

On the Bristol Channel storms and storm surges have occurred throughout history and have been the cause of substantial damage and flooding from the sea, both in the past and more recently. A number of recent storm and coastal flooding events are shown below.

During the years 1981, 1984, 1990, 1996, 2008 and 2010, there were significant storm surges which caused substantial damage and flooding along the coast of Somerset and some coastal flooding in southeast Wales. A good knowledge and understanding of the causes of such storms and surges is very helpful in assessing risk and informs the planning process.

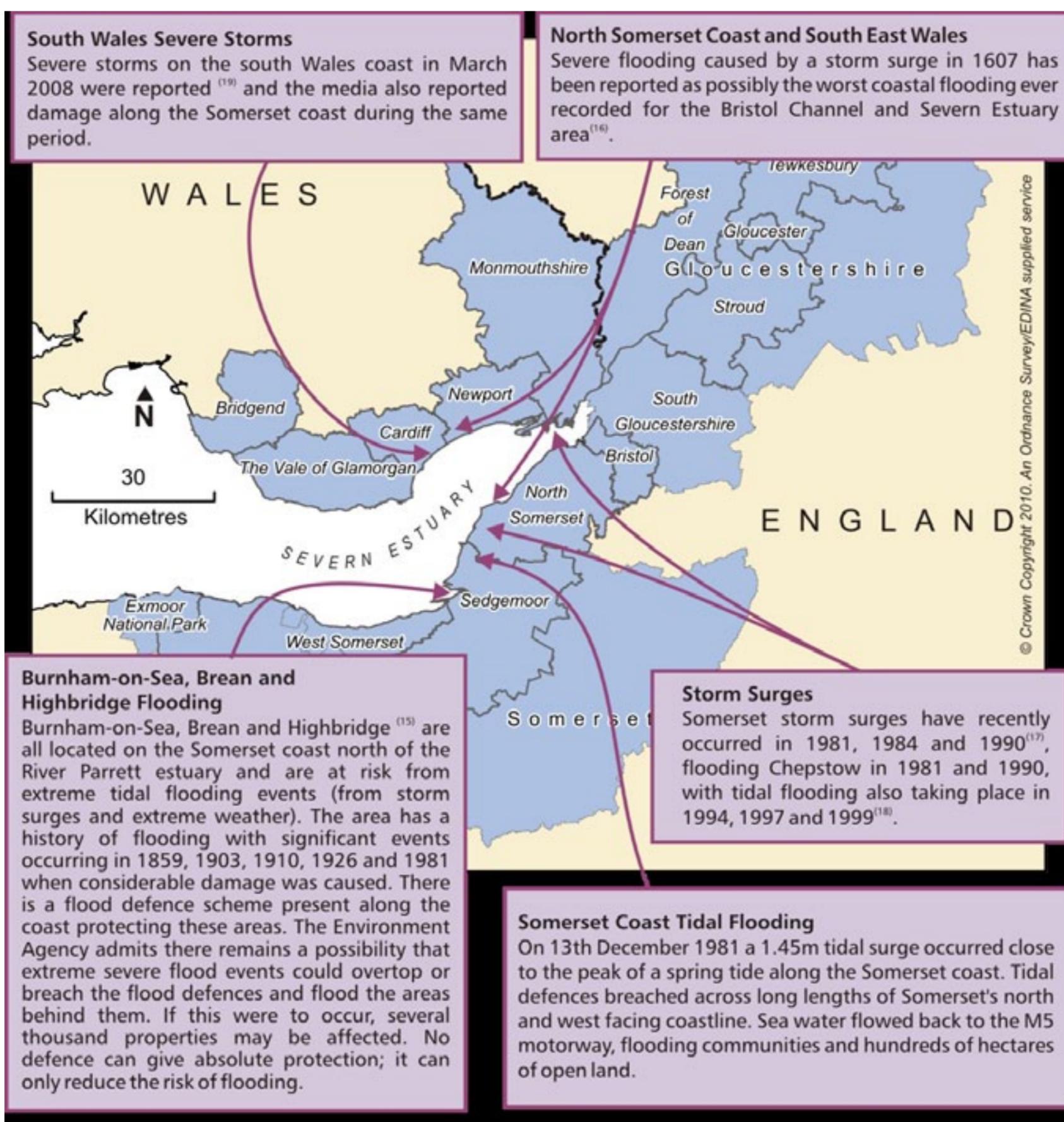


Figure 1: Examples of severe storms on the Severn Estuary, adapted from Hovey et al, 2010

Findings

High water events

This timeline shows the maximum elevation of water at the tide gauge at Avonmouth referenced to Ordinance Datum Newlyn, put in date order. The bars indicated in dark blue are purely tide with little or no weather impact. The bars in red are events which are known to have caused coastal damage or overtopping of sea defences etc.

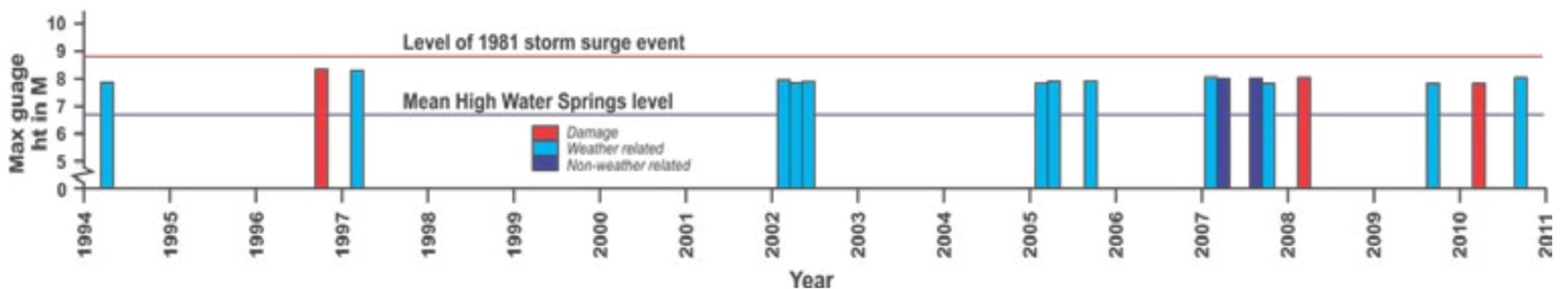


Figure 2: Maximum water elevations at Avonmouth 1994 – 2011. Data from BODC

Key issues

- There are meteorological similarities between the storm surge of 1981 and 2008.
- Southeasterly winds, which create a bulge in the water which travels up-channel as a significant surge, have a significant impact.
- Strong/gale force winds from the westerly quadrant are important in creating modest surges and overtopping/coastal damage.
- Northeasterly winds are important in erosion and coastal risk to those areas of the Bristol Channel exposed to this direction.
- Short term events are important.

References

- Hovey CE and Rodgers NP 2010. IMCORE Climate Change Report Card: www.severnestuary.net
- Phillips MR 2008. Consequences of short term changes in coastal processes: a case study. *Earth Surface Processes and Landforms*: 2094-2107.
- Horsburgh K and Horrit M 2006. The Bristol Channel Floods of 1607 – reconstruction and analysis. *Weather* 61(10): 272-277
- Proctor R and Flather RA 1898. Storm surge prediction in the Bristol Channel – the floods of December 1981. *Continental Shelf Research*, 9(10): 889-918

Further Information

- Climate change on the Severn Estuary: <http://www.severnestuary.net/sep/partnership/docs/ClimateChangeReportCard5.pdf>