

The Flood Plain at Wheatfen

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The creation of embankments including in recent years those at Strumpshaw along the River Yare below Norwich has resulted in the Surlingham, Wheatfen and Rockland Broad marshes being the major area for flood waters to invade. Over a twelve year period the tidal levels, and especially those resulting in flooding, have been monitored at Wheatfen Broad. These provide evidence of the importance of this area of fens/marshes in limiting the effects of flooding in the Yare river valley.

In the 1950s the marshes supported large areas of Reed Sweet-grass, *Glyceria maxima*, which is a plant liking wet conditions. By the millennium most of these *Glyceria* dominated areas had either vanished or seriously declined. This loss can be attributed to the invasion of reed, alder/willow carr and the negligence of the dyke drainage systems in the marshes. Lack of cutting for fodder is also a possible contributory factor. On some of the landward dyke's water extraction for irrigation was also a factor. The fens appear to have become drier during these fifty years.

The chlorine levels at Wheatfen Broad are normally 80ppm but occasional tidal surges have raised these to 250ppm. However, the overall effects of saline waters are limited because of the twice daily tidal range.

Since the 1990s the whole drainage system at Wheatfen has been reinstated such that, following mud-pumping and dredging programmes, water now comes on and off the fens easily. Foot drains (grups) on some fens facilitate this process. Much of the alder/willow carr has been removed to return the marshes to reed and sedge fens. The carr previously acted as a sump for flood waters and held volumes back in the hollows and pulk holes between the trees. Reed fens have flourished under this reinstated system which allows ease of water flow on and off the peats.

Between 1990 and 2002 Phyllis Ellis recorded the tidal levels at two gauges in the Wheatfen complex. The gauges were levelled to O.D. Newlyn (Ordnance Datum) and the data records heights of water relative to Newlyn. The data was originally recorded four times a day but later this was reduced to show heights of high water only. At Wheatfen the fens become flooded at heights in excess of 80cm. There were difficulties in accurately recording heights over 100cm since the flood water prevented access to the gauges. Sometimes these could be estimated from flooding in the cottage and sometimes by water marks/diatoms on the gauges as the levels receded.

The data below covers the winter period 1st October until 31st March when most serious flooding occurs. The average winter flood levels range from 87.93cm to 94.59cm. In 1997 the ebbing waters receded at a rate of 8cm/hour whilst flood water levels in 1990 rose at 10.5cm/hour.

The flooding of this part of the Yare valley is dependent upon many factors. The critical ones include northerly winds forcing sea water down the North Sea which, if they coincide with spring tides, results in high levels in the River Yare. Rainwater can add to the flooding problems where the freshwaters meet the tidal surges.

During the 1990s the levels of sediment build-up in the Wheatfen complex was of the order of 1cm a year. These sediments were largely formed from diatom cases. The reduction in phosphate and nitrogen levels in the last decade has lowered the populations of diatoms hence the cloudy waters previously noted have been replaced by clearer waters. The rate of sediment settling has thus declined.

Data recorded for Wheatfen clearly shows the importance of the flood plain in controlling excess water levels in the Yare. Between 1999 and 2002 the fens were flooded for over 20 days in the winter period. Since sea levels in the UK have risen by 10cm since 1900 and estimates indicate sea level rises between 26cm and 86cm in the south east by the 2080s then real problems will occur. Extreme high water levels, which currently have a 2% annual probability, could become 10 to 20 times more frequent at some east coast sites.