Broadland Ecohydrological Observatory: Winter update 2018
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A major challenge for Broadland is adapting to climate change where over the next 50 years the area is likely to experience hotter drier summers, wetter warmer winters, more intense and frequent rainfall storms, heatwaves and droughts, possibly coinciding with surge tide events, and sea level rise. There is evidence that Broadland peatland surfaces have kept pace with past sea level rise but it is unclear what will happen under future sea level rise, and how floodplain fens like Wheatfen will respond to flooding and tidal surges. The Broadland Ecohydrological Observatory (BEO) is a new fen monitoring station at Wheatfen collecting long-term data on meteorological conditions and ecological and hydrological changes in semi-natural wet woodland. In autumn 2018, the observatory completed its first year of data collection.

Progress in 2018
Over the last year, two phases of installation (September 2017 and April 2018) deployed an automatic weather station and equipment to monitor water level and water salinity at various points throughout the fen:

- Air temperature
- Air humidity
- Rainfall
- Wind speed
- Wind direction
- Barometric pressure
- Incoming solar and UV radiation

### Meteorological conditions
- Monitored every hour

### Water levels
- Fen water level
- Open water level (ditches)
- Monitored every half hour

### Water movement
- Peat permeability
- Groundwater flow
- Manual readings taken at different times of the year

### Salinity
- Salinity of open water
- Salinity of fen water
- Monitored every half hour (open water) and occasional readings (fen water)

Weather highlights from 2018
- **Minimum air temperature was -6.3 °C** in March during the ‘Beast from the East’ which was accompanied by strong, biting winds.
- **Maximum air temperature was 32.8 °C** during the July heatwave.
- **Average monthly air temperatures during the summer were warm/hot:** 15.5 °C in June, 18.2 °C in July and 16.9 °C in August. These values are ‘in-the-shade’ temperatures taken 1.3m above the ground (a meteorological standard) and the monthly averages include night-time temperatures.
- **Annual rainfall was low** at 397.2 mm (up to 13th October). The typical value for this part of England is around 600-650 mm so it will be interesting to see if this average is reached before the end of the year.
- **The summer was exceptionally dry** with no rainfall at all during the period between 10th June and 27th July.
Initial data from the wells shows strong tidal cycles in the ditches, and frequent inundation of the fen surface (which many readers will know about!). When the fen surface drains of water as the ditch water levels fall, subsequent falls of water level in the peat are slow – the peat itself doesn’t drain very quickly, although this is a provisional finding because we have yet to analyse all of the well data.

**Plans for 2019**

The weather station and wells will continue logging data throughout the year. During early 2019 we aim to complete the surveying of all instruments so that the water levels measured in different parts of the fen can be related to Ordnance Datum and we will work towards adding to the BEO. For example, we plan to undertake measurements of peat permeability, so that we can use computer models to simulate the water-table fluctuations. These models, if they work well, can help us look into the future to see what will happen to fen water tables. For example, how might they respond to future droughts? We also plan to involve visitors and volunteers in some aspects of the data collection for the observatory. For example, manual water level loggers can be installed at various points where visitors can record the maximum and minimum water levels. Using volunteers will increase the spatial coverage of changes across the fen and is a fun way of getting more people involved in the BEO.

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