

FINAL

Summary of investigation into RSPB analysis of relative gauge-board levels between the internal and external systems on the Butterfly Conservation land at Catfield Fen

'Annex 3 Statistical analysis of water level data (Internal and external gauge boards) from RSPB to NE 13/11/13' by R.Mason has confused the two gauge boards.

NTG3261G1 measures water level in the Internal system.

NTG3261G2 measures water level in the External system.

It appears the gauge board data have been correctly labelled internal and external in the hydrographs.

There have been changes in the way the gauge-boards were measured, which have lead to some confusion. Prior to 2003, manual readings were recorded as the water level position below the top of the gauge-board. From 2003 onwards, data were recorded more conventionally as 'stage'- the height above the bottom of the gauge-board (gauge zero). The first figure appears to have assumed the pre-2003 manual readings are stage, rather than dip. While understandable, as gauge-board data are normally recorded in this way, it does mean that the record is incorrect. Loggers were installed on the two gauge boards in June 2006.

Detailed work on the data was done to remove errors, and correct to Ordnance datum for the report by Dr Geoff Mason (Final version 10th August 2012). Figure 1, taken from the report shows the corrected data, which do not show the same significant declining trends. Both gauge-boards were re-surveyed in 2013, and the latest datum has been applied to the record (figure.2).

In the 'Internal/external trend 2004-2012' analysis, the hydrographs produced with corrected and uncorrected data are similar, although at a lower level relative to Ordnance Datum (Figure 3).

The analysis of relative internal and external water levels appears wrong. The mean water level (1996-2013) for NTG3261G1 is 0.48 m AOD, while for NTG3261G2, it is 0.46 m AOD, suggesting external water levels are generally slightly below internal levels during the period of record. This is consistent with comparative levels reported in Mason 2012.

Data set 2, used to calculate the difference between internal and external water level was not available to me. Relative levels using EA data from 1996-2013 are shown in figure 4. Using the same data between 2002-2013 (figure 5), the data appear similar to those used in the RSPB analysis. However, the RSPB hydrograph using data set

2 shows levels generally in the negative (external level higher than internal) from about the middle of the record, which the EA data do not show.

General points

NTG3261G2 has some readings recorded as 'dry'- these have been omitted from the analysis, as anomalous.

There does not appear to be any declining trend in data from either gauge-board over the period of record (1996-2013).

Silting up of the dyke in which NTG3261G2 is located may have made it shallower than when first installed, and resulted in water level not being recorded below 0.41 m AOD since 2002 (Mason, 2012).

Mason (2012) could not identify any trend in relative water levels over the monitored period, and this has not changed with the addition of more recent data and correction based on the 2013 topographic survey.

Mason (2012) stated '*there is some indication that the amount by which the internal system can be higher than the external system has been less in recent years, since 2008, but this is not always the case as in early 2009. The reduction in the difference may be due in part to the water levels at NTG3261G2 being relatively higher than in some previous years (Figure E33) and this may be a consequence of the ditch becoming more overgrown and silted up. However, this is not certain.*'

The report conclusions (Mason 2012) also highlighted the effect of overtopping and breaches in the bund reducing the internal water level, and therefore the difference between internal and external levels.

Water levels in both the internal and external systems are managed, and this management will heavily influence gauge-board readings.

Response to summary points

No regression analysis has been carried out on the corrected and updated data.

There is no evidence of a decrease in dyke water levels in either the internal or external systems over the whole monitored period. There may possibly be a downwards trend in more recent years, but the evidence is far from conclusive.

There does appear to have been a decrease in the difference between the internal and the external water levels from 2002 to 2013. This may be caused by a number of factors, including silting up of the external system, and a decreased ability of the bund to retain water in the internal system.

The decrease in the relative water level of the internal to the external system does not offer strong evidence that the site is drying out.

The RSPB analysis does not appear to have benefitted from the work done by Dr Mason in 'Catfield Fen Investigation- Final Report (10th August 2012)'. It represents the most comprehensive analysis of observed data from the site to date, and any further work should take it into account.