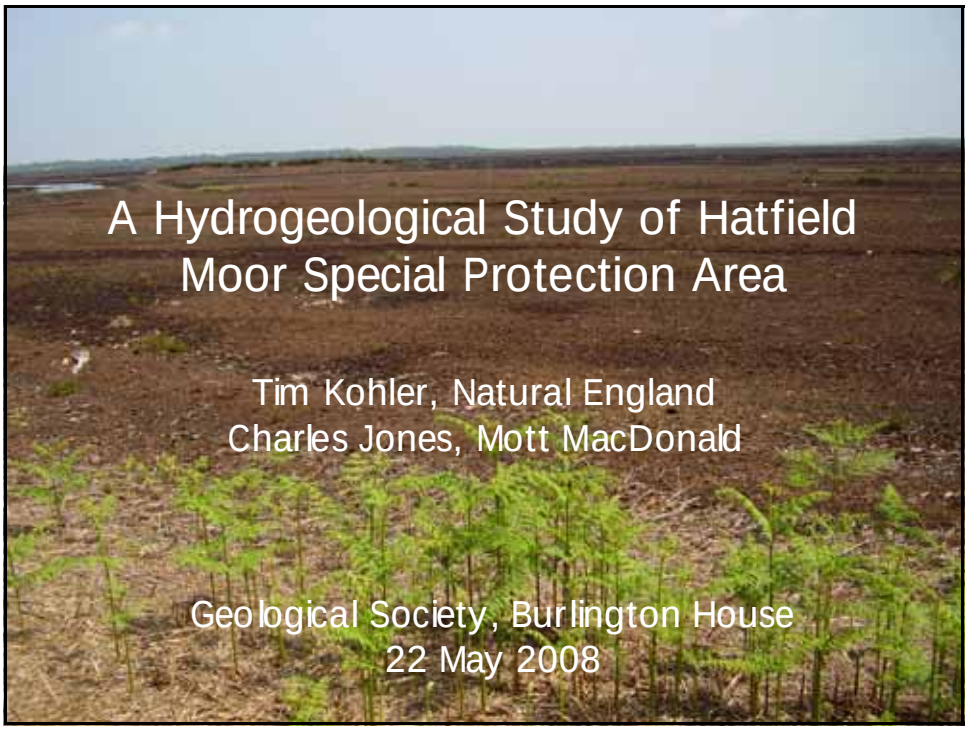


A Hydrogeological Study of Hatfield Moor Special Protection Area

Tim Kohler, Natural England
Charles Jones, Mott MacDonald

Geological Society, Burlington House
22 May 2008

Introduction

- Ecology and Restoration Objectives
  - Tim Kohler
- Hyrogeological Monitoring and Interpretation
  - Charles Jones
- Conclusions

Hatfield Moor SPA - Location

Hatfield Moor - Post Milling

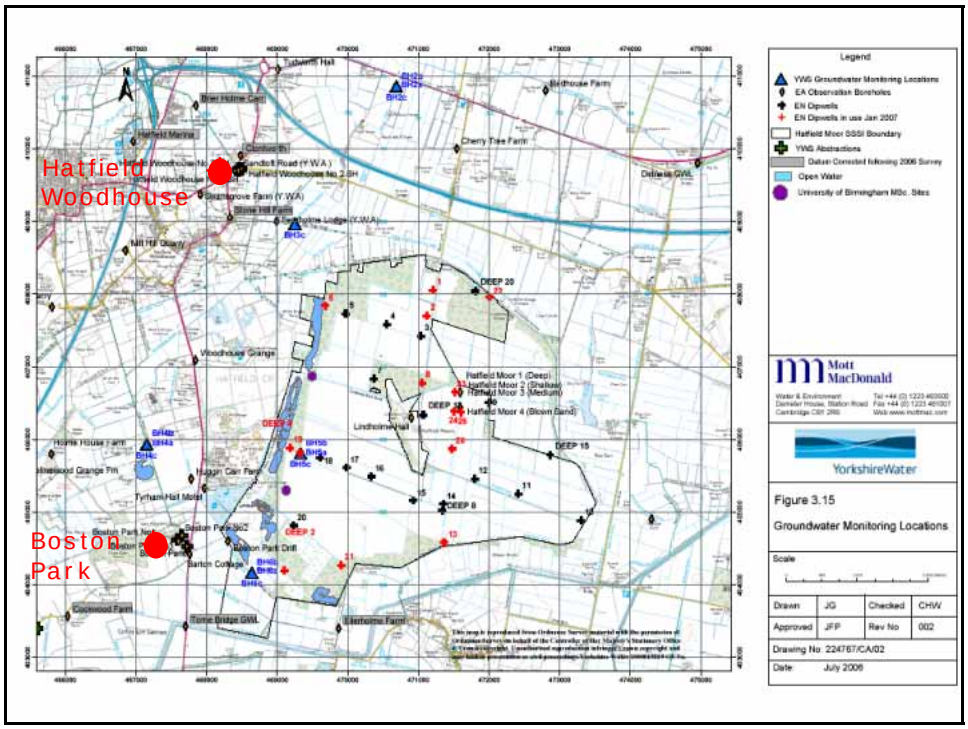

Typical Bog in Favourable Condition


Restoration - Bund Construction

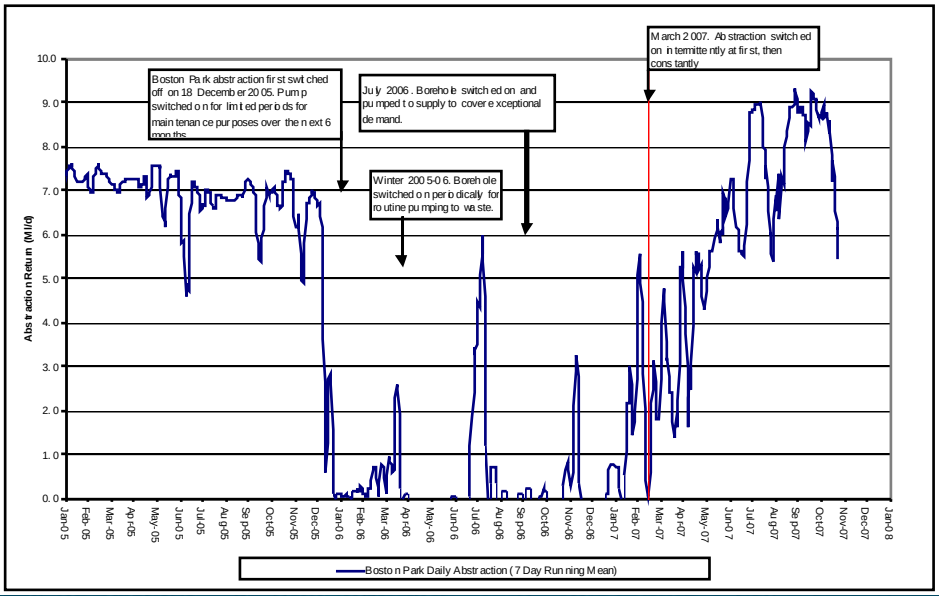
Restoration – Bunds in Action

Work undertaken in Jan 2006-Mar 2008

- Collection of monitoring data
- Basic data collation
- Liaison with Agency Model Study
- Liaison with Sheila Imrie (Univ Birmingham MSc)
- Review of LIDAR data and topograpic survey
- Focus study – SW Corner

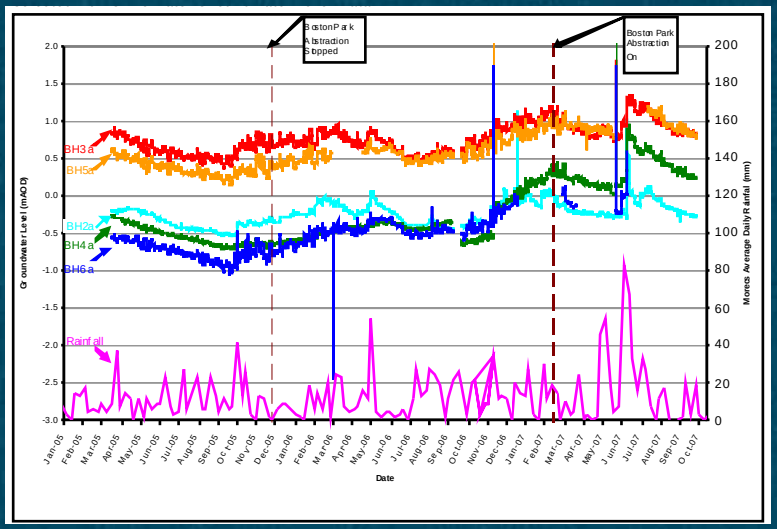


Boston Park YWS Abstraction: Recent

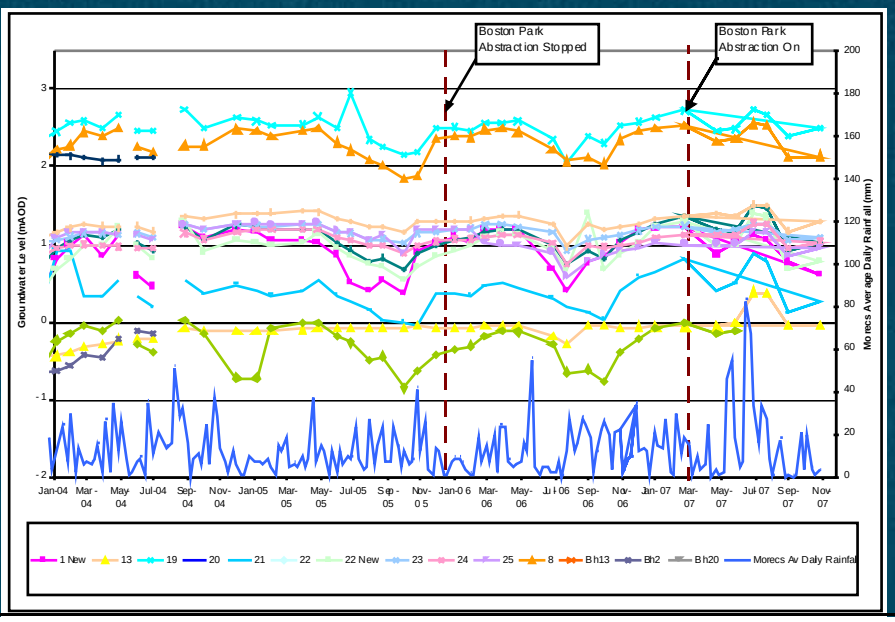


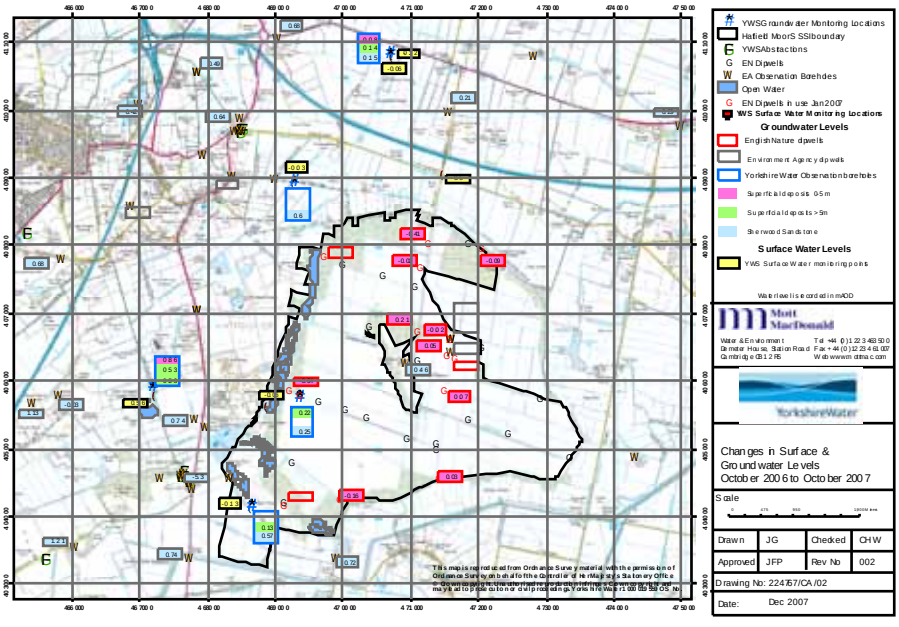
Hatfield Moor – Shallow Geology on Whvw#Vgh

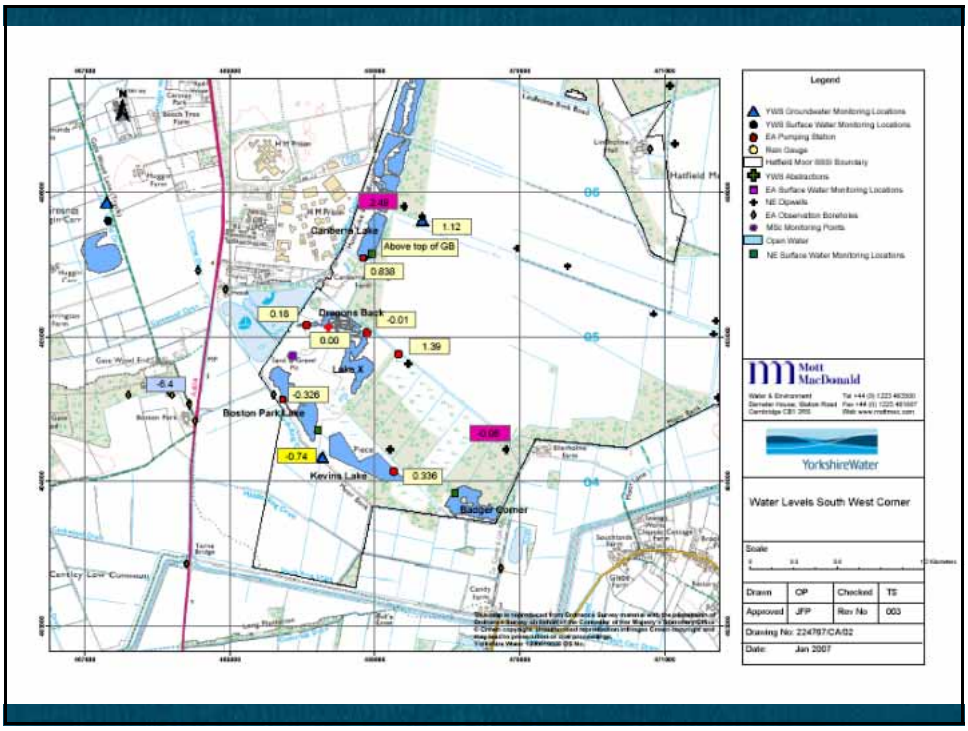
Selected Yorkshire Water Groundwater Level Data



Natural England Dipwell Data





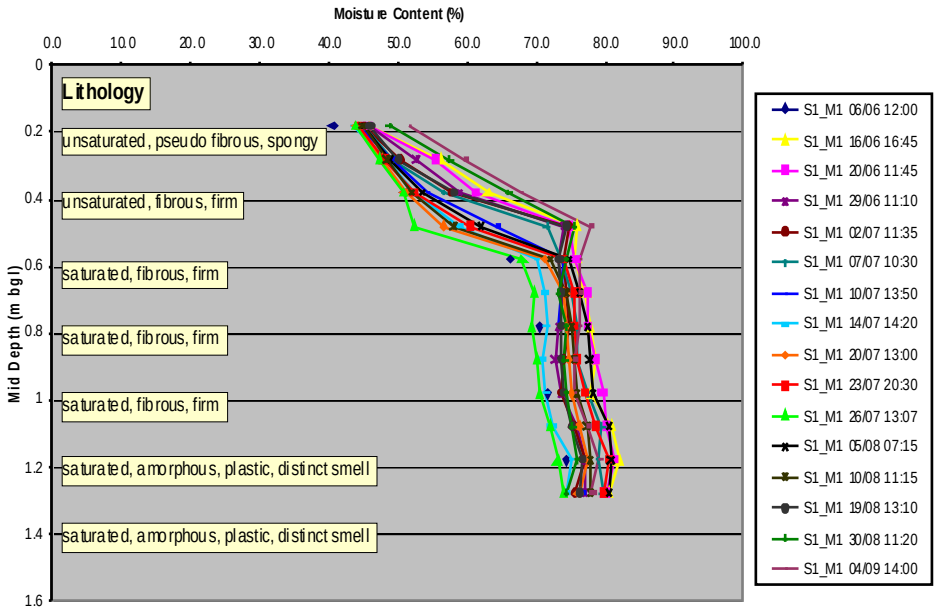

Legend
YWS Groundwater Monitoring Locations
YWS Surface Water Monitoring Locations
EA Pumping Station
Rain Gauge
Hatfield Moor SSSI Boundary
YWS Abstractions
EA Surface Water Monitoring Locations
NE Dipwells
EA Observation Boreholes
MSc Monitoring Points
Open Water
NE Surface Water Monitoring Locations
Canberra Lake
Above top of GB
Dragons Back
Lake X
Boston Park Lake
Kevins Lake
Badger Corner
Mott MacDonald
YorkshireWater
Water Levels South West Corner
Scale
Drawn
CP
Checked
TS
Approved
JFP
Rev No
003
Drawing No: 224797/CA/02
Date:
Jan 2007


Data Collected 28/02/06
Legend
LIDAR Recorded Groundlevel (maod)
<VALUE>

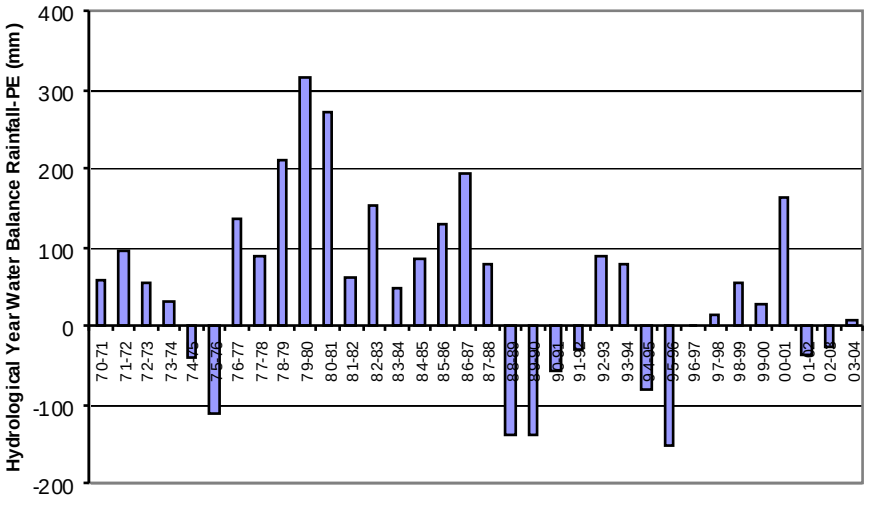
Sheila Imrie MSc – Summer 2006

- Two study areas
- Multiple piezometers:
  water level – depth – time
- Time Domain Resistivity Probe:
  moisture content – depth - time
- Soil Tensiometer:
  moisture suction – depth – time
- Infiltration Tests:
  infiltration rate – time
- Lab Tests:
  MC, Density, Suction (Centrifuge)

Field data for TDR Probe in Peat



Simulated Water Balance for Peat Cell



Conclusions

- Drawdown impacts from Boston Park observed in limited area in south east corner of SPA. Good correlation in unaffected areas
- Cone of depression is assymetric.
- Groundwater levels in shallow peats not observed to respond to drawdown in sandstone. Good correlation in unaffected areas.
- High density layer /low permeabilty layer occurs at base of peat
- Upward flux in shallow unsaturated zone results in 20-30% moisture loss in top 20-40 cm in summer 2006
- Groundwater levels in shallow peats responding very well to bunding in wetter conditions. Control of surface runoff is vital.
- Vegetation also responding well from spring 2008
- Model suggests rainfall may be inadequate to prevent SMD in dry year sequences
- Ecosystem and restoration vulnerable to climate change

Scientific Challenges

- Obtaining good evapotranspiration estimates or measurements – will MOSES-PDM help?
- Understanding sensitivity of cotton grasses and spagnums to moisture stress and effective root depth
- Measuring surface water losses off Moor and preventing shallow lateral drainage