Newham Fen NNR
Northumberland
- an example of GDE complexities?

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Newham Fen

- Site & setting
- Water level monitoring
- Interpretation of evidence
- Conclusions thus far
- Further work?
Newham Fen & Embleton’s Bog – view over site
Embleton’s Bog (Western Fields)

Newham Fen

Lough Bank
Vegetation – SAC description

- Newham is important as a lowland short sedge fen in north-east England, a part of the UK in which **Alkaline fens** are rare.
- The site is an example of basin fen, developed from the hydroseral succession of a small lake.
- The main fen community is M13 *Schoenus nigricans* – *Juncus subnodulosus* mire and M9 *Carex rostrata* – *Calliergon cuspidatum/giganteum* mire,
- and there are transitions to S25 *Phragmites australis* – *Eupatorium cannabinum* tall-herb fen, MG1 *Arrhenatherum elatius* grassland and W2 *Salix cinerea* – *Betula pubescens* – *Phragmites australis* woodland.
- A number of rare species occur at this site, including narrow-leaved marsh-orchid *Dactylorhiza traunsteineri*, coralroot orchid *Corallorhiza trifida*, dark-leaved willow *Salix myrsinifolia* and round-leaved wintergreen *Pyrola rotundifolia*.
Vegetation
Questions

• Key source(s) of water for the fen?
• Main controls on water levels both within fen and wider Embleton’s Bog?
• Implications for site management?
  – Habitat restoration in areas outside SSSI / NNR?
Both limestone groups mainly sandstones & mudstones with coal & limestone bands
Newham Fen
Superficial geology

- Alluvium
- Peat
- Newham Fen
- Glaciofluvial sands & gravels
- Till
History of investigations

• Thompson 1963 – auger (?) investigations
• Newson 1983 onwards – hydrological investigations & series of reports (manual dipwells plus chart recorders; N)
• Early 1990’s – effects of drought (4 successive years!) on vegetation
• Vegetation – 1958 onwards
• Various BSc, MSc & PhD theses!


• Wetherell 2010 onwards – hydrological monitoring (dataloggers etc)
  – Anything new to learn??!
Recovery of water levels

33 hours

21 hours

Recovery of water levels
Two distinct types of response?
## Distribution of loggers

<table>
<thead>
<tr>
<th>Western Field (Embleton’s Bog)</th>
<th>Intermediate</th>
<th>Fen</th>
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<tbody>
<tr>
<td>78076</td>
<td>78221 (reedbed)</td>
<td>75867</td>
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<tr>
<td>78233</td>
<td>H8940 (carr)</td>
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</table>
Newham Fen - water levels & rainfall Jan 2010 to May 2012. [Fen, reedbed & carr]

- reedbed
- carr
Very responsive to rainfall
Variation in water levels 40cm+
Frequently >20cm below surface
Summer 2010  
Before the rain 2012

Much less responsive to rainfall
Water levels generally within 5cm of ground level
Borehole

• Drilled 1997 in response to drought

• Source of water for fen?

• But water wrong chemistry?
  • generally higher pH & lower EC than fen etc waters.

• Now forms part of EA groundwater monitoring network
Head ~3.5m above ground level (12/08/2010)
Borehole log

Alkaline fen groundwater??
Cross section E – W

From Newson 2002, based on Thompson 1963
Sands & Gravels – Lough Bank

- Glaciofluvial deposits
- Described in BGS memoirs – but also Geological Conservation Review (GCR)
  - Bradford Kames SSSI
  - 13km long feature
  - Notified for glacial geomorphology
- “Series of elongate mounds of sand and silt associated with locally sinuous, esker like ridges composed of silt, sand and gravel”
- “Casts of feeder meltwater streams, which formed as subglacial or englacial eskers”

- Springs (local) & other peat deposits associated with ridge
Other investigations
Prickstock – EC-T probe

Prickstock - Dipwell 34

Depth (cm)

Temp (°C)

EC (μSx0.01)
Temperature - dataloggers

Dataloggers - temperature record

Graph showing temperature record over time with different dataloggers indicated.
Conclusions thus far

• Fen area predominantly groundwater fed
  – Aquifer = Lough Bank
• Western fields – precipitation & surface water
• While both part of wider Embleton’s Bog, different WETMECs

• Restoration of western fields to fen?
  – No – needs (alkaline) groundwater input
• Restoration of western fields to wetland?
  – Yes – water level management to remove water in spring?
    (breeding waders & grazing)
Further work

- Estimate water balance – implications of fluvioglacial aquifer
- More detailed analysis of logger data (eg rainfall responses; T?)
- Further water chemistry analysis (pH / EC in particular)
- Look at drainage network further – field drains etc; water level management
- Borehole datalogger analysis
- Dipwell + datalogger on E edge fen (drift aquifer)
- Prickstock in fen? – transects / grid
- Numerical model??
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• Andrew Craggs; Rob Low

Rainfall data & land management history
• Rosie (Newham Hall)