Fire site restoration costs: the Bleaklow 2003 fire

Jonathan Walker • Matt Buckler
Moors for the Future Partnership
The restoration of wildfire sites

Need to assess:
• If restoration is required
• What intervention is required
• When the restoration should be carried out

There are no set prescriptive actions
Restoration intervention needs to be site, incident and priority specific

Factors include:
• Site history
• Resilience of site (integrity)
• Size, severity and intensity of fire
• Timing of fire
Stabilisation – heather brash

• Between 2003 and 2007, ~12,000 bags (1,500 tonnes) of brash have been spread.
• This entails 2000 helicopter drop-offs (a helicopter can carry up to 6 dumpy bags).
• Brash is spread on slopes of angles up to 30°.

<table>
<thead>
<tr>
<th>Brash costs per hectare</th>
<th>£ 5,265</th>
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</thead>
<tbody>
<tr>
<td>Application of heather brash includes the cost of the brash, airlifting and spreading</td>
<td>£ 5,265</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>£ 5,265</strong></td>
</tr>
</tbody>
</table>
Stabilisation – geo-textiles

- ~160 km of geo-textiles laid
- 286 bales (560 m rolls)
- 143 helicopter drop-offs

**Geo-textile costs per hectare**

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
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<tbody>
<tr>
<td>Application of geo-textiles to gully sides; includes cost of geo-textiles, fixing pegs, airlifting and labour costs</td>
<td>£ 9,163</td>
</tr>
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<td>Rates per hectare are indicative and dependent on the extent of gullying</td>
<td></td>
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</table>

**Total** £ 9,163
Seeding with a grass nurse crop

*Lolium spp.*, *Festuca spp.*, *Agrostis castellana* & *Deschampsia flexuosa*

<table>
<thead>
<tr>
<th>Nurse crop costs per hectare</th>
<th></th>
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<tbody>
<tr>
<td>Application of granulated lime to increase the pH (y1; ~1000 kg/ha)</td>
<td>£187</td>
</tr>
<tr>
<td>Application of fertilizer (NPK) (y1; ~365kg/ha)</td>
<td>£97</td>
</tr>
<tr>
<td>Application of grass seed (y1; 50kg/ha)</td>
<td>£104</td>
</tr>
<tr>
<td>‘Top-up’ treatment (depending on fertility): Lime (y2; 1000 kg/ha)</td>
<td>£187</td>
</tr>
<tr>
<td>Fertilizer (y2 &amp; y3; 300 kg/ha)</td>
<td>£156</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>£653</strong></td>
</tr>
</tbody>
</table>
Diversification - plug planting

- 5 species: bilberry, crowberry, cloudberry, cotton-grass 2 spp.
- Increasing biodiversity
- Increase structural complexity - rhizomes or extensive surface growth aid surface stabilisation

<table>
<thead>
<tr>
<th>Diversification costs per hectare</th>
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</thead>
</table>
| Planting five moorland species (~1 plant per 4 m².) | y1 = £ 3,000  
| | y2+ = £ 1,500  
| | **Total** | **£ 2,250** |
Bleakow 2003 fire site costings

To date (4.3 km$^2$) = £1,235,000
= £2,900 ha

This is the cost to restore half the Bleaklow 2003 fire site – *including historic damage*

~3 km$^2$ of the Bleaklow fire site ‘unrestored’
Fylingdales Moor Fire - 09/03

- An upland heathland wildfire that burnt 250 ha of SSSI moorland and over 30 Scheduled Monuments.

- Several inches of peat were lost in the exceptionally intense blaze, destroying the seed bank and leaving a bituminised surface.
Fylingdales Moor - Restoration

**Phase 1: October 2003-2004**
- Gullies blocked with heather bales to prevent peat and ash being washed off the site
- 60% of the site was sown with a ‘nurse grass’ plus heather and wavy-hair grass seed mix.
- The cost of Phase 1 was £55,000

**Phase 2: October 2004-2006**
- Heather seed, wavy-hair grass seed and heather brash was collected from the adjacent / local moorland and spread by quad bike.
- Bell heather and cross-leaved heather collected and from site <2 miles away spread on site. 100 juniper trees were grown from locally collected seed and planted out
- The cost of Phase 2 was £85,000
Fylingdales Moor - Costs

<table>
<thead>
<tr>
<th>Phase</th>
<th>Spend</th>
</tr>
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<tbody>
<tr>
<td>Phase 1</td>
<td>£ 55,000</td>
</tr>
<tr>
<td>Phase 2</td>
<td>£ 85,000</td>
</tr>
<tr>
<td>Management</td>
<td>£ 15,000</td>
</tr>
<tr>
<td>Archaeology</td>
<td>£ 80,000</td>
</tr>
<tr>
<td><strong>Total Restoration</strong></td>
<td><strong>£ 155,000</strong></td>
</tr>
<tr>
<td><strong>Total with Archaeology</strong></td>
<td><strong>£ 235,000</strong></td>
</tr>
</tbody>
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194 ha were treated; costs are:

£ 800 ha – restoration  
£ 1,120 ha – restoration & archaeology
Harbottle Fire - 04/07

- Moorland blaze near Harbottle, in Northumberland NP

- 40 fire-fighters and 60 personnel from partner organisations; two helicopters deployed

- Under control within 10 hrs, although many workers continued to damp down 'hot spots'

- 8 km$^2$ of forest and moorland were destroyed by the fire – “the biggest fire of 2007 and perhaps in the last five years.”
Harbottle Fire - Restoration

- No restoration has been undertaken
- Monitoring underway
- Heather seems to be recovering well, but areas where peat burnt away are not recovering quickly
- Cost: £0 ha
Relative costs of the Bleaklow restoration

Expense:
• Restoration starting point: the result of cumulative (historic) pressures and events
• Logistical challenges

Long-term savings:
• Ecosystem Services
Thanks
Rachael Pickering, Gill Thompson,
Sharon Davison, Will Hewson
Summary of economic costs of the Bleaklow 2003 fire

<table>
<thead>
<tr>
<th>Costs of suppression</th>
<th>£550,000</th>
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<tbody>
<tr>
<td>Cost to local economy</td>
<td>£500,000</td>
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<tr>
<td>Costs of restoration</td>
<td>£1,250,000</td>
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<tr>
<td>Total</td>
<td>£2,300,000</td>
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</tbody>
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Value / economic impact on Ecosystem Services??