

Costs of Suppressing Wildfires

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Fire above Greenfield Brook, Easter Monday 13 April 2009

Costs of Suppressing Wildfires

- Wildfire “careers”
- Timing, duration, size
- Fighting a wildfire: access, reliability of response, effectiveness, clear up time
- Benefits of fighting fires – *avoid a worse incident*
- Costs incurred
 - Appliances
 - Helicopters
 - Special equipment (all terrain vehicles, ponds)
- Case study: Bleaklow 2003

“Fire Careers”

Wildfires are either solved in one evening or set in for three days.

Fires develop over time, growing in severity

Career depends upon:

- Temperature
- Wind speed
- Moisture
- Fuel load
- Vegetation type
- Topography
- Intervention to fight the fire

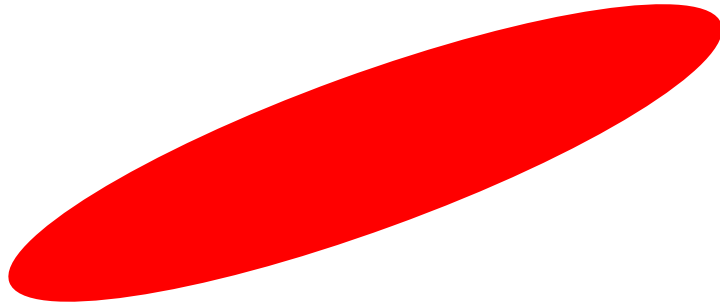
Speed of spread of head fire accelerates with width (up to a limit)

Cost of fighting fire grows disproportionately in first few hours

MORAL: catch them early !

Fire careers – fire spread on moorland

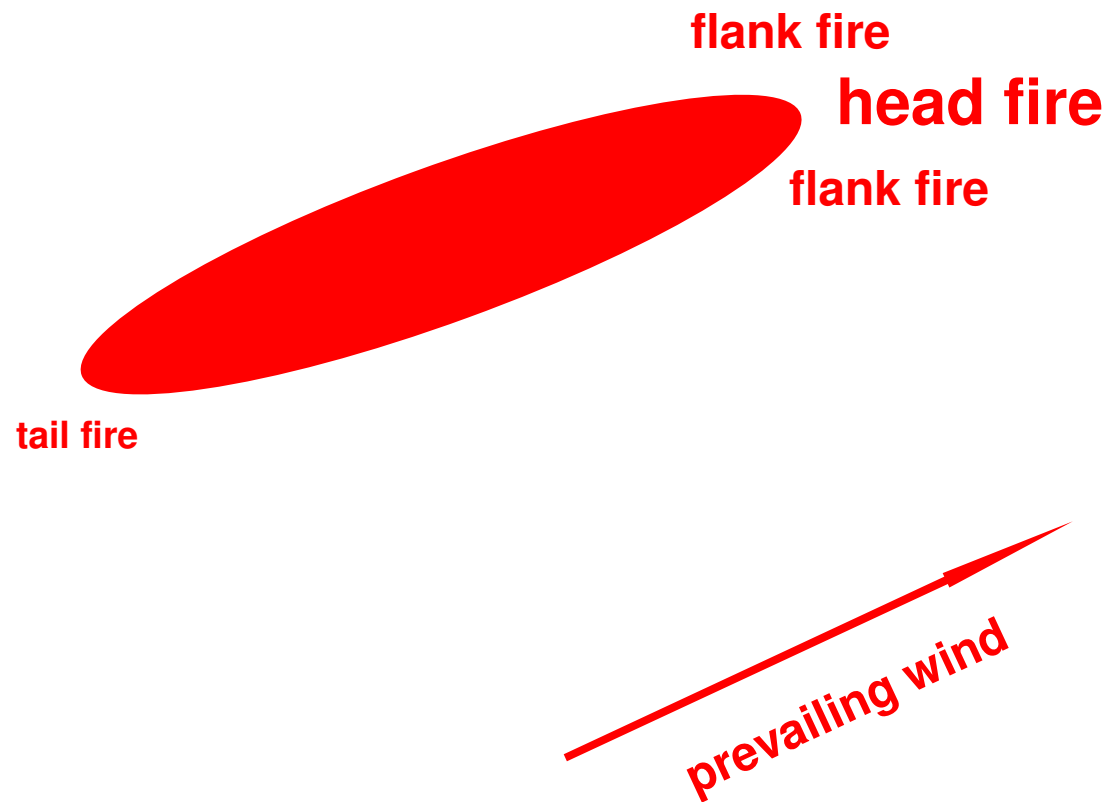
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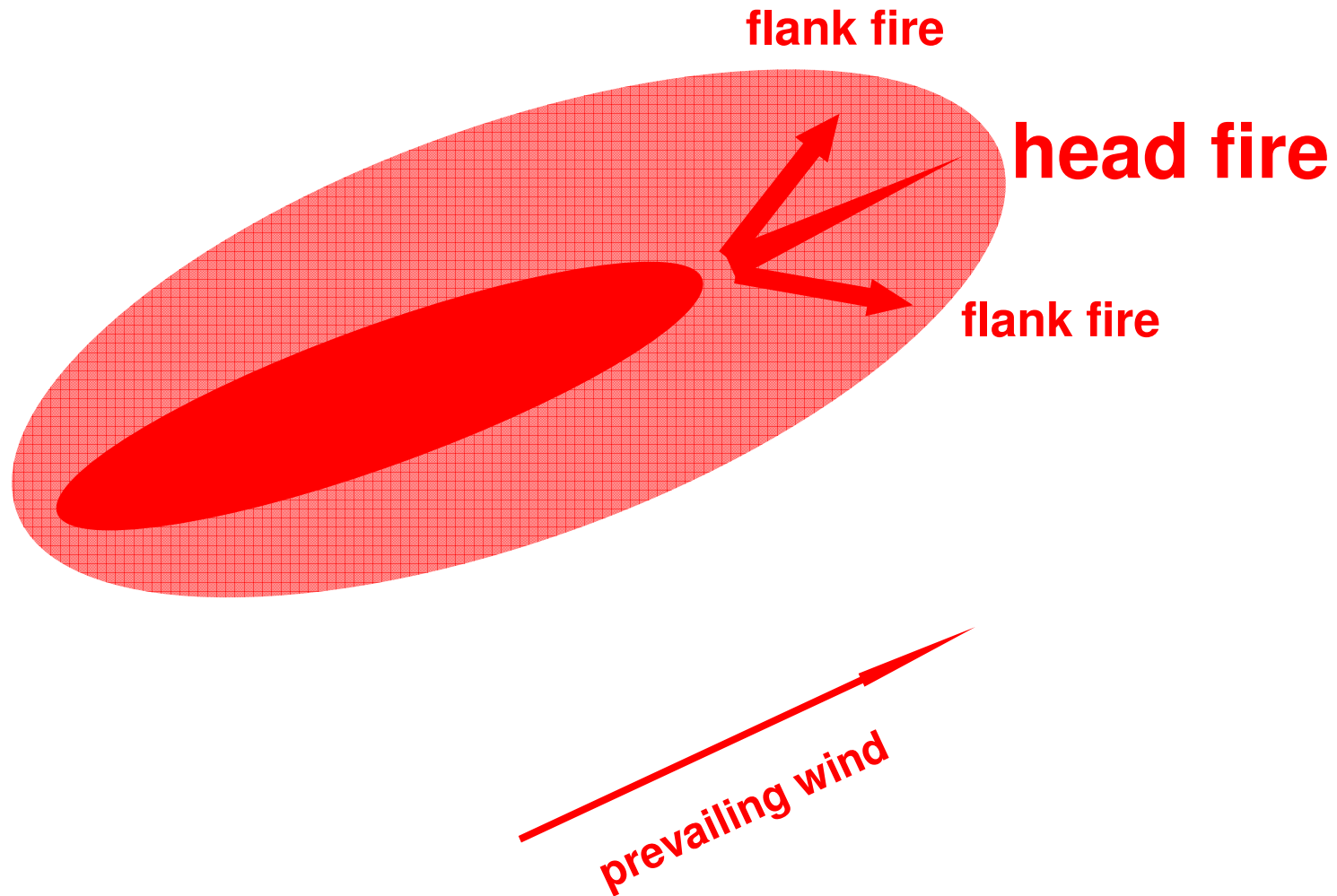
**Small Fire spread up hill, Crowden,
suppressed by Pennine Helicopters, July 2006**



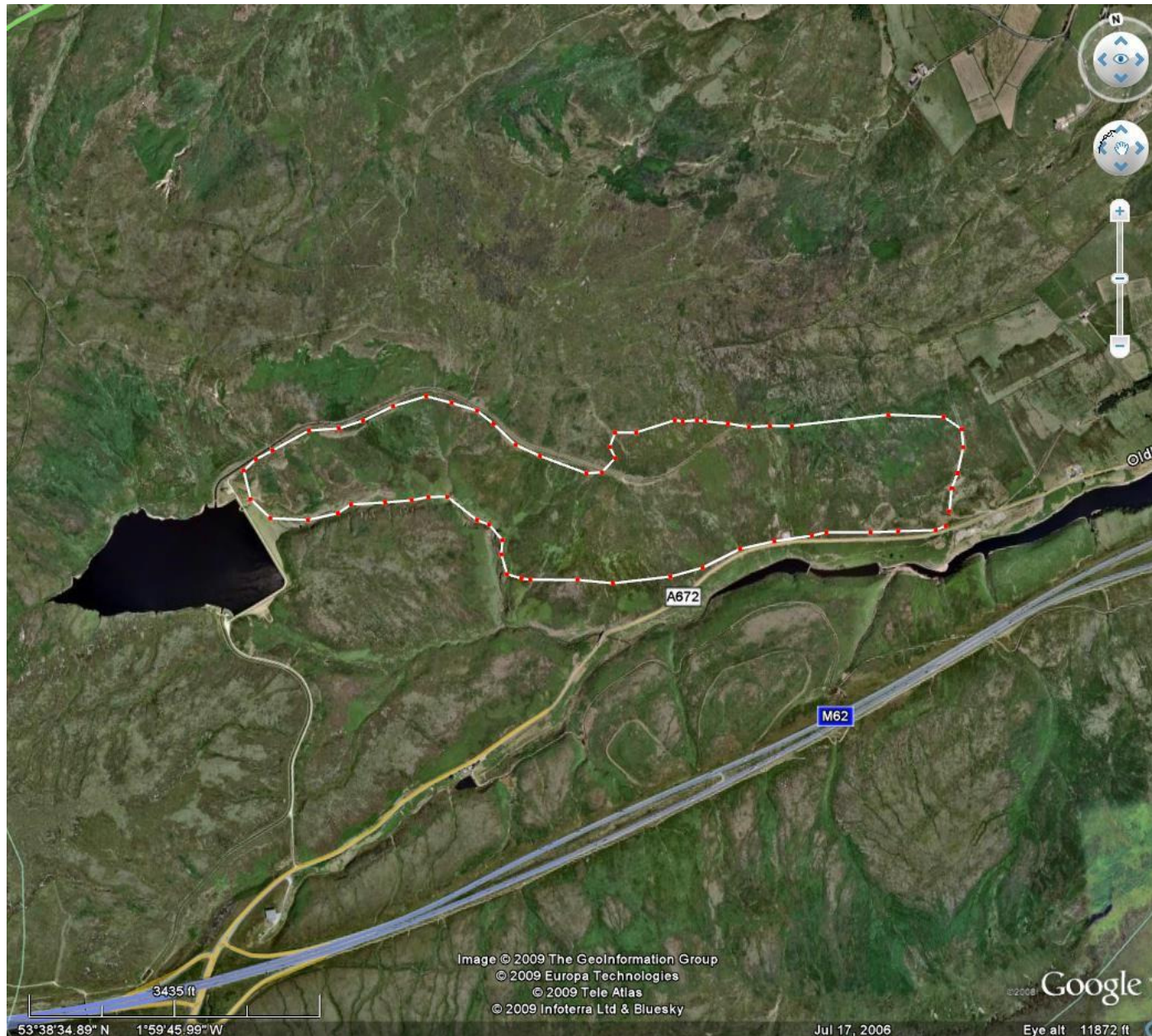
Fire careers – fire spread on moorland



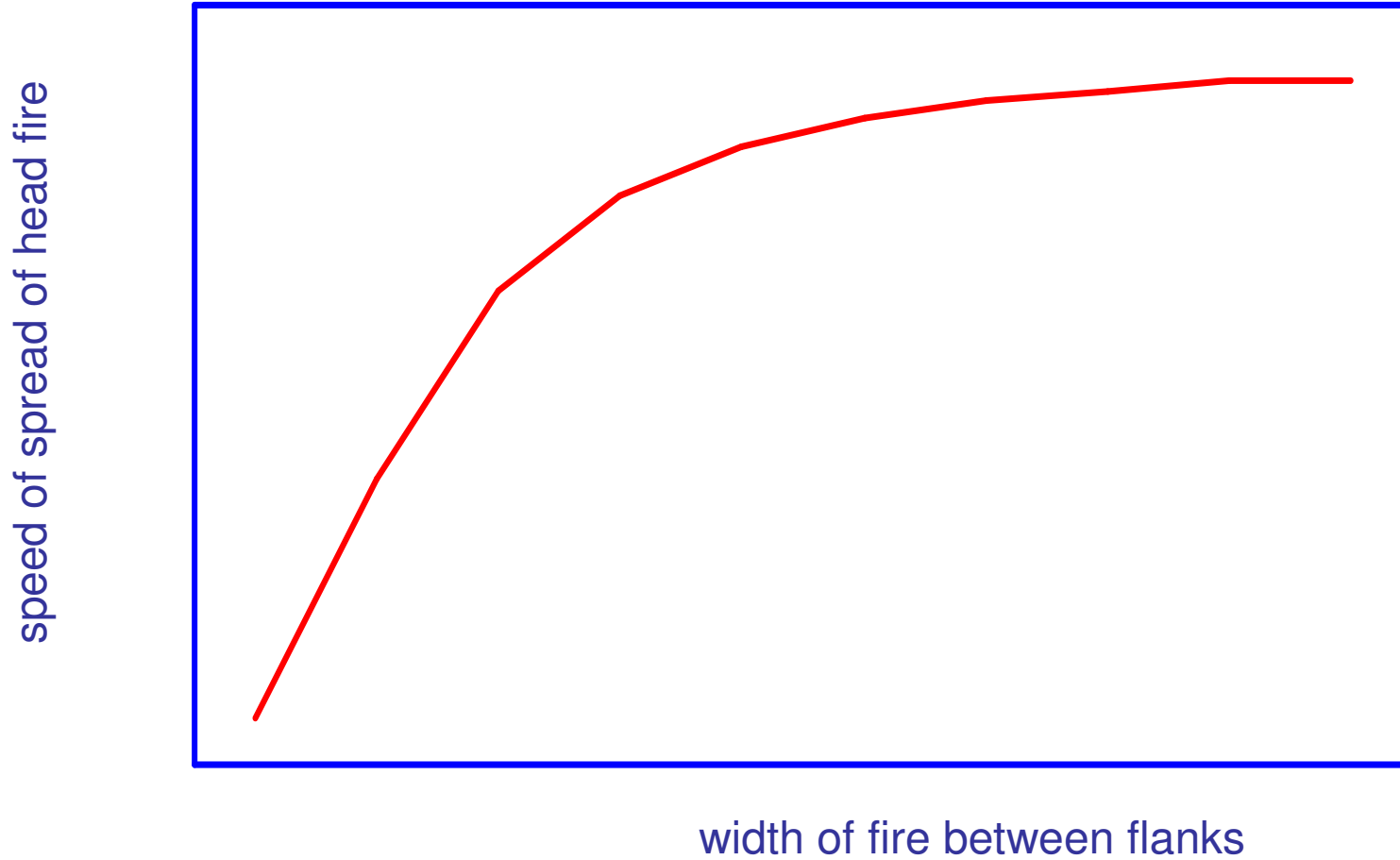
spread of flank fires allow head fire to grow



Fire spread, Rishworth Moor, Easter Sunday, 12 April 2009



Fire behaviour: spread of flank fire allows head fire to grow



Timing, Duration and Size

Three-quarters of all wildfires reported between 13.30 and 16.30 (and 40% between half-three & half four)

- One day incidents
- Major incidents – typically three days
- (Occasional prolonged incidents - Stalybridge, Irlam Moss)



damping
down at the
Roaches,
July 2006

Character of Moorland Wildfires, Peak District and West Yorkshire

	One day	Major incident
Duration (average time: report to close)	4 hours	3 days
Size (average)	15 hectares	350 hectares (also deep burns)
Total appliance hours (average)	15 hours	130 hours
Typical cost to Fire and Rescue Service (average)	£15,000	£210,000 and Helicopter call-out, Property damage
<p>Source: Analysis of 14 fire reports from Fire Services and Rangers, interviews with members of the Fire Operations Group and visits to fire sites</p> <p>Note: Limited sample size and limited data availability. Outlier case omitted</p>		

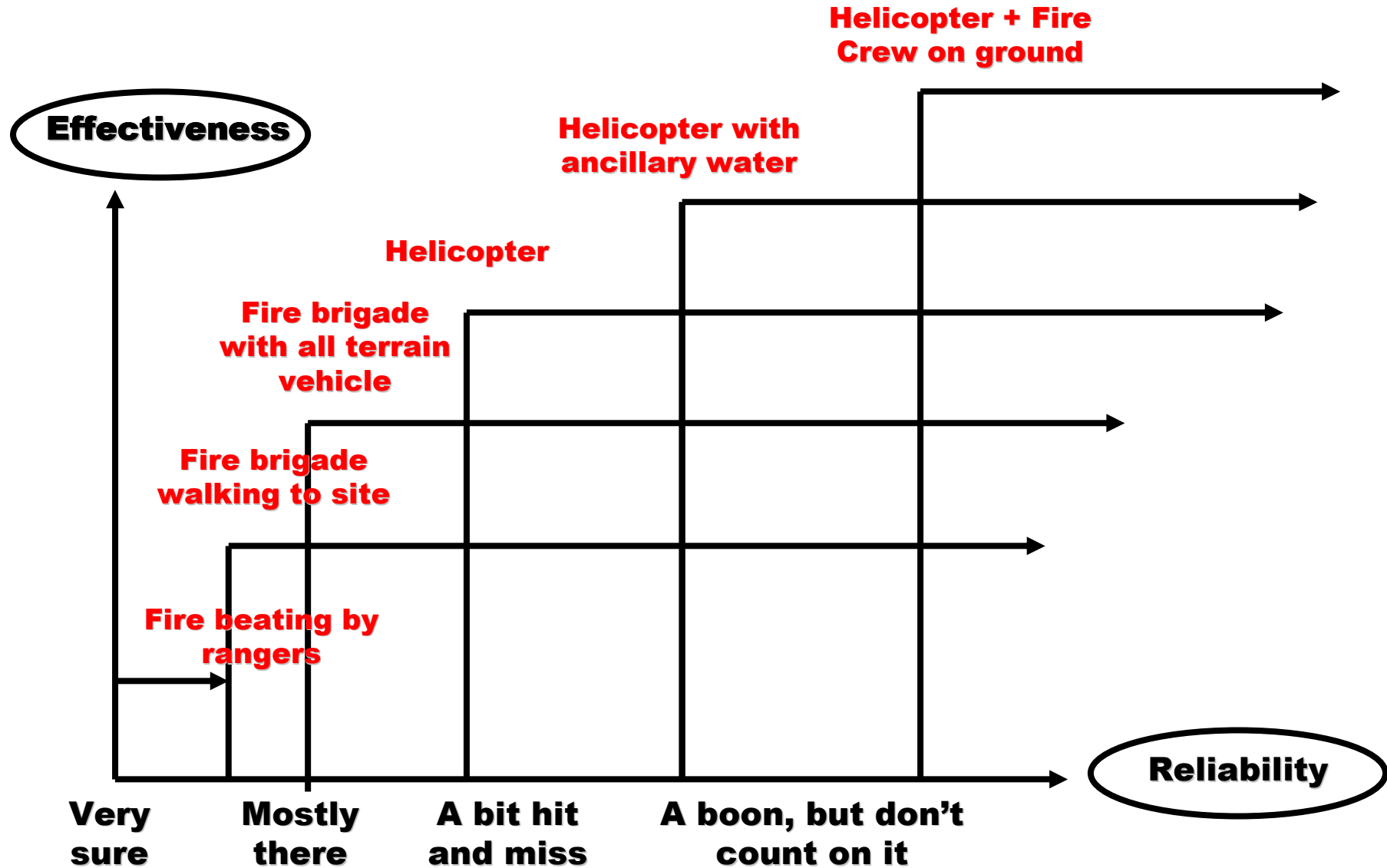
Fighting a wildfire: access, reliability of response, effectiveness, clear up time

- Access: major incidents in hard to reach locations away from roads on hills (Bleaklow, Kinder, Ilkley, Roaches)
- Best strategy depends upon *reliability* and *effectiveness* (rangers *reliable*, helicopters *effective*) - Case for policy change towards helicopter call out ?
- Retrieving equipment an issue



ATV approaching the
Roaches, July 2006

Reliability/Effectiveness Trade off – Moorland Fire Fighting



Benefits of Fighting a Fire . .

Aim to catch fire earlier in its "career",

- stop a one day fire turning into a three day fire . .
- A three day fire into a disaster . .

Cut a £210,000 incident back to a £15,000 incident – save 335 hectares of ecosystem damage

Potential savings in cost of incident justify investment *even if seldom used*

- ✓ Fire watching at key times
- ✓ Ancillary water supplies to support helicopter
- ✓ All terrain vehicles to reduce access time for equipment on first evening
- ✓ Helicopter stand-by



Mobile water tank,
Leek Fire Station



National Trust temporary pond, Upper North Grain

Costing Wildfires

“marginal opportunity cost” as crew usually retained fire fighters, appliance depreciates with use, hoses lost to shifting fires, fuel £50 an hour, crew almost £100 an hour + call out

Published charges: (2009 – W.Yorks)

- major pump hire £380 per hour
- deployment and recovery high volume pump = major pump + 2 demountable units = £1,065 per hour + operation £335 per hour

£3,600 a day to run a single appliance 24 hour manned station (86% of this is employment costs)

Overlooks command officers, command unit, four wheel drives, ATV's, hose lorry, provisioning vehicles, movements for cover between stations (begins to double cost), crew retrieval, clean up after operation at both site and station, rangers and gamekeepers attending fires



Staffordshire appliances at the Roaches, July 2006

**Rule of Thumb £1,000 per
“appliance hour” to fight
moorland wildfire**

Cost of Using Helicopter

Say, £2,000 an hour with equipment (tariffs vary).

Twice the cost of a surface appliance + 4 crew per hour with support equipment

But:

Effective and rapid response

-Fire appraisal

-dousing

Dramatic cost saving if can prevent fire developing

Use in positioning equipment, e.g. pumps on hose line; use in evacuation & retrieval



Costing the Bleaklow Fire, Peak District National Park, 17th April 2003

Duration (report by helicopter to close of fire)	5 days Fire on Kinder broke out day before diverting equipment	Start: 13.48, 17th End: 18.08, 22nd
Area burnt	744 hectares (deep burns into peat) Water catchment for United Utilities	23.9 ° maximum temperature on 17 th , day before Easter; winds 9,8,13, 11, 4, 6 mph, easterly, dry
Total appliance hours	perhaps 450 hours + Pumps + ATVs + fogging units + hoses	Inferred from similar incidents and an outline report
Total cost (estimated) £550,000, of which:	Fire and Rescue Service £450,000	Helicopter call-out Civilian and RAF £55,000 (inferred) Fencing etc £45,000 (known)
Source: Countryside Agency; Derbyshire Fire and Rescue Service; Met Office weather data for Buxton		
Note: ignores loss of grazing, shooting and extra water treatment costs		

Research Issues

Basic Statistics, on fire incidents – post-mortems? (PNDPA fire reports and Fire and Rescue Service Incident reports available)

Fire Severity, not just when fires occur, *but their severity*

Costing of alternative strategies: more precise estimates of the economic and environmental costs and benefits of various options for responding.

Reliability and effectiveness of alternative fire fighting techniques

Need to understand fire behaviour: the “career” of wildfires: how and when they start, develop, expand, die down, or are extinguished

A warm thankyou to all who helped:

- Gina Cavan and Dr Kevin Albertson
- Professor John Dold for advice
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- Members of the Peak District Fire Operations Group for advice



Support vehicle,
Leek Fire Station