**Drought: Understanding and reducing vulnerability through monitoring and early warning systems (M&EWs)**

# DRIVER Workshop 1 – Key Findings


Centre for Ecology & Hydrology
NATURAL ENVIRONMENT RESEARCH COUNCIL

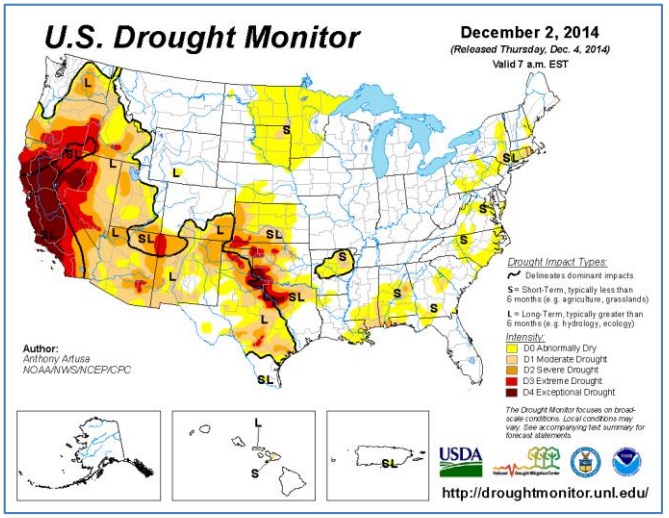
The Open University

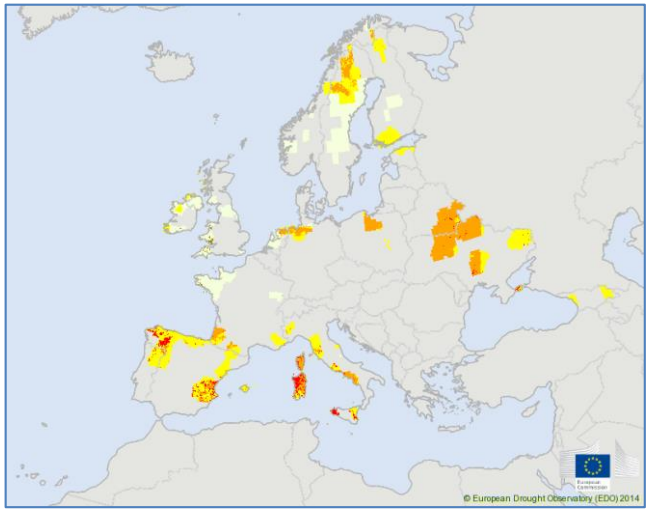
NERC SCIENCE OF THE ENVIRONMENT

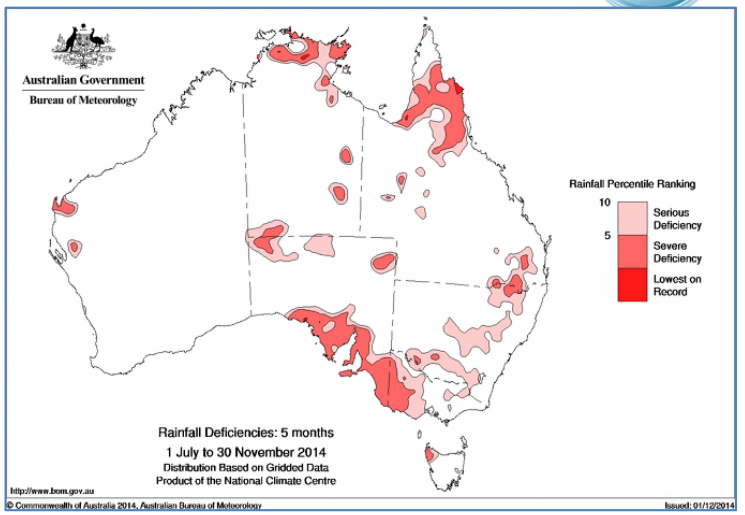
# Acknowledgements


- Sophie Haines – IMPETUS, University of Oxford

# DrIVER Case Study Regions

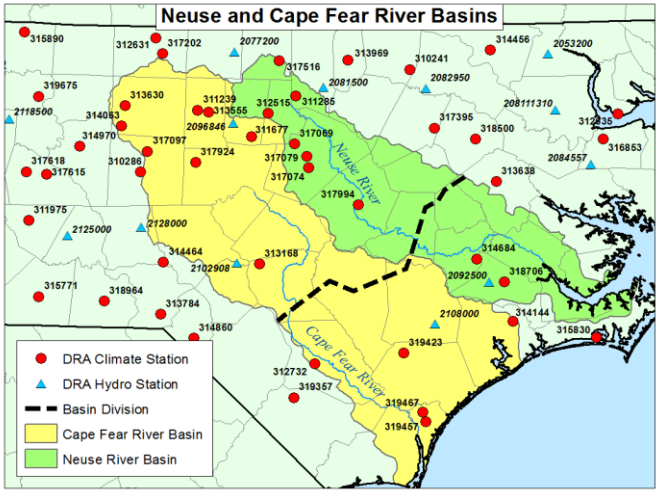



## North Carolina

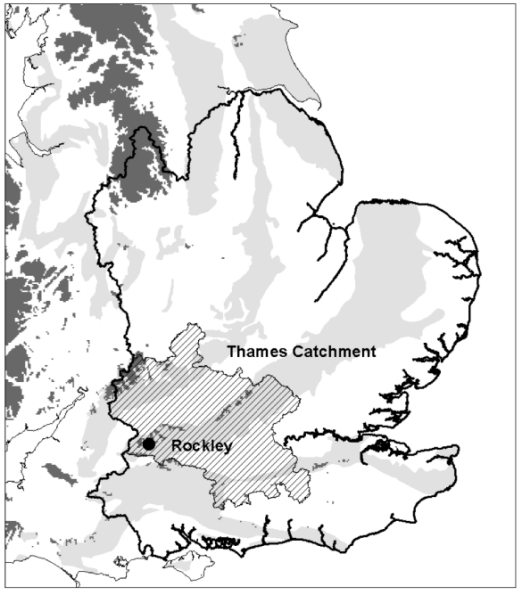
- Drought 2007/8




US Drought Risk Atlas

## Lowland England

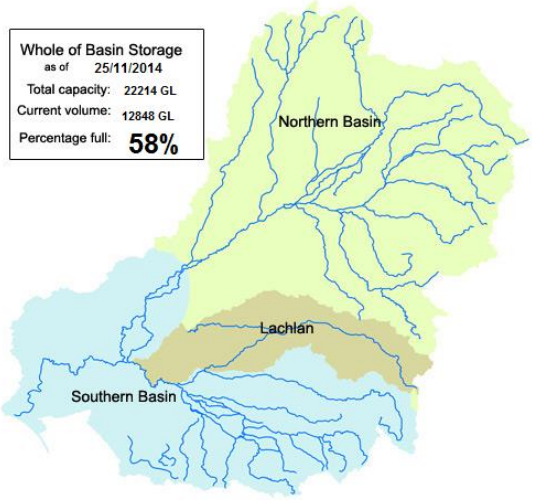
- Drought 2011/12




Folland et al. HESS 2015

## Lower river Murray/Adelaide

- Millennium Drought 1998-2012




Murray Darling Basin Authority

# Focus of Workshop 1

1. NERC drought projects
2. DRiVER and early highlights
3. **Participants' views of drought**
4. M&EWs future needs
5. Future DRiVER and NERC research

# Attendees

- 44 delegates: government, regulators, water suppliers, farmers, power generation, public health
- Collaborators: IMPETUS; Historic Droughts; OMPORS

# Workshop 1 - Inquiry

1. Introduction to workshop

2. Conversation: MEWS: How do we know we are in drought?

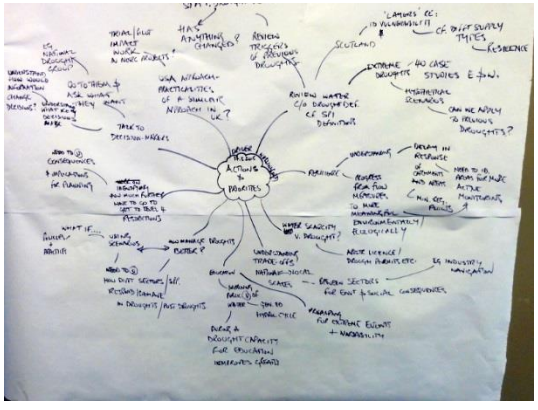
3. Plenary Key Points


4. Presentations: International perspectives on droughts and MEWS

5. Conversation: What should MEWS in the UK look like in the future?

6. Plenary Key Points

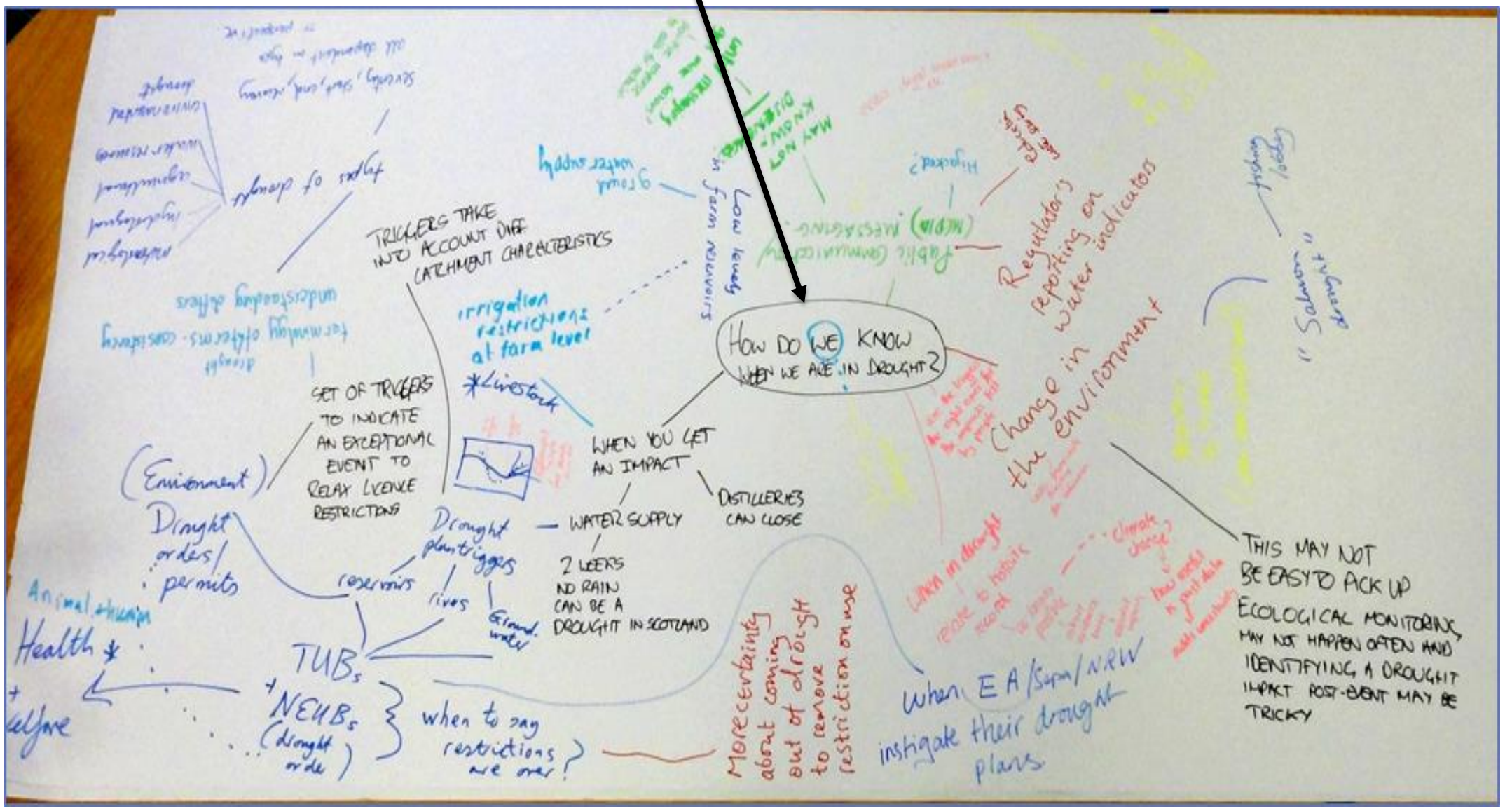

7. Presentations: M&EW in the UK: What's on the horizon?



8. Plenary – Key Points on MEWS future needs

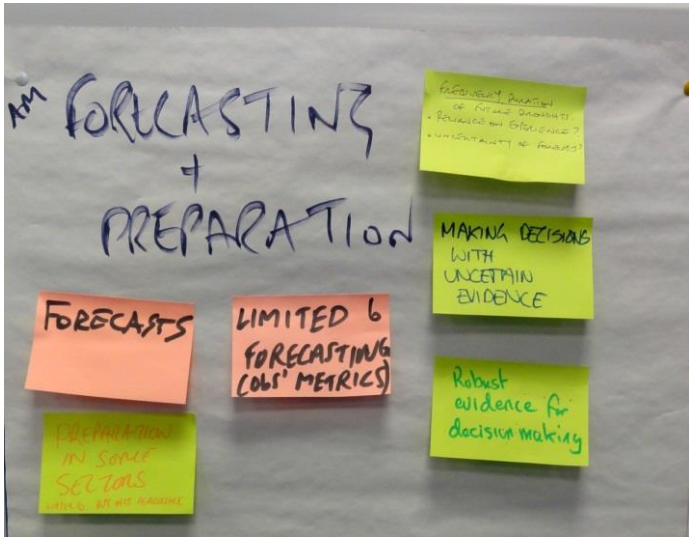
9. Actions and priorities

# “How do we know when we are in drought?”

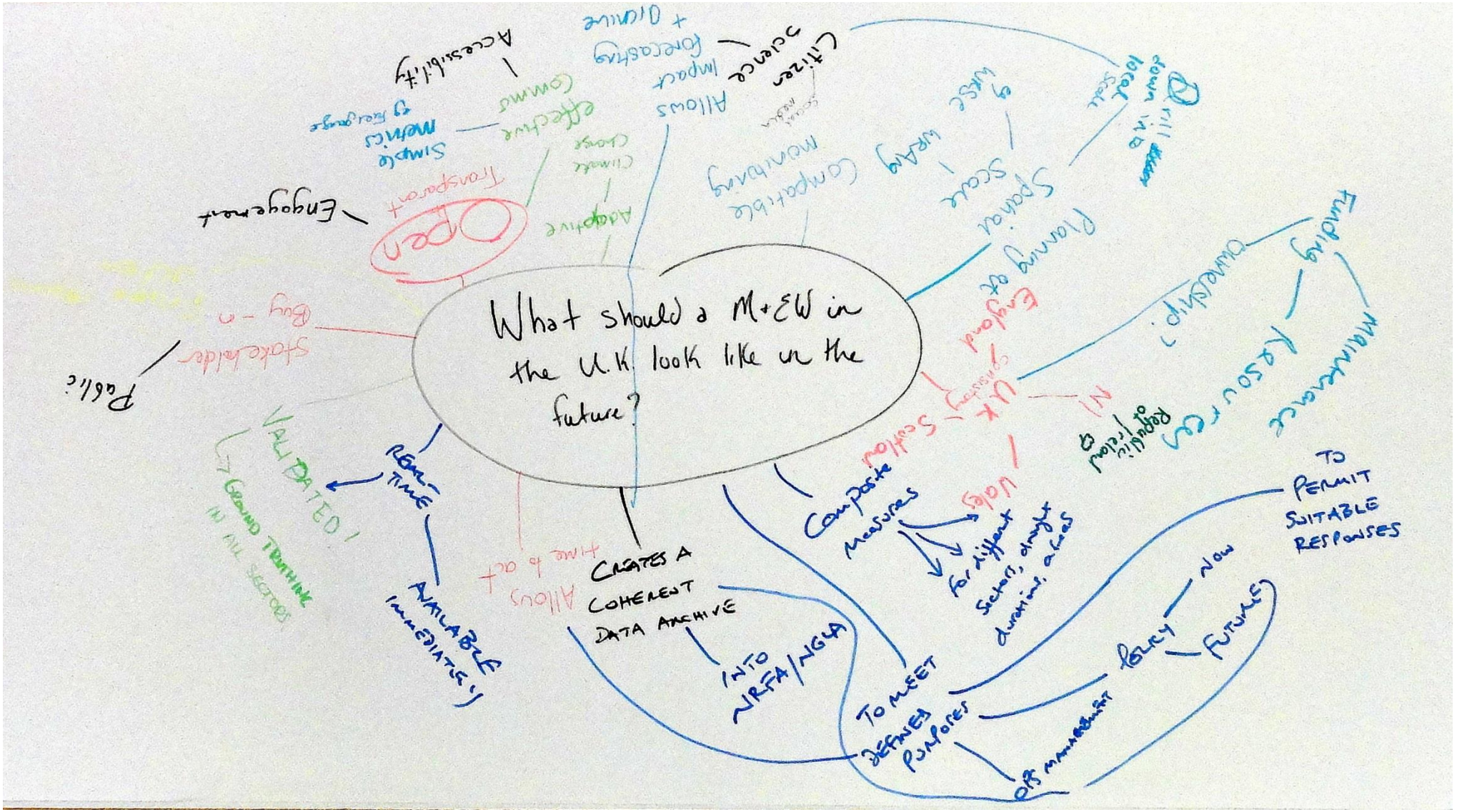


# “How do we know when we are in drought?”

- **Types of droughts**: geographies, resilience, supply, societal impact
- **Uncertainty and risk**: duration, sector, consensus
- **Preparation and forecasting**: onset, reliability, uncertainty
- **Impacts**: health, indicator-impact, hindsight, thresholds, visibility, natural?
- **Public communication, education**: (social) media, hype, restrictions
- **Politics / governance**: declaration, event/exception, visibility
- **Resilience**: pressure, investment



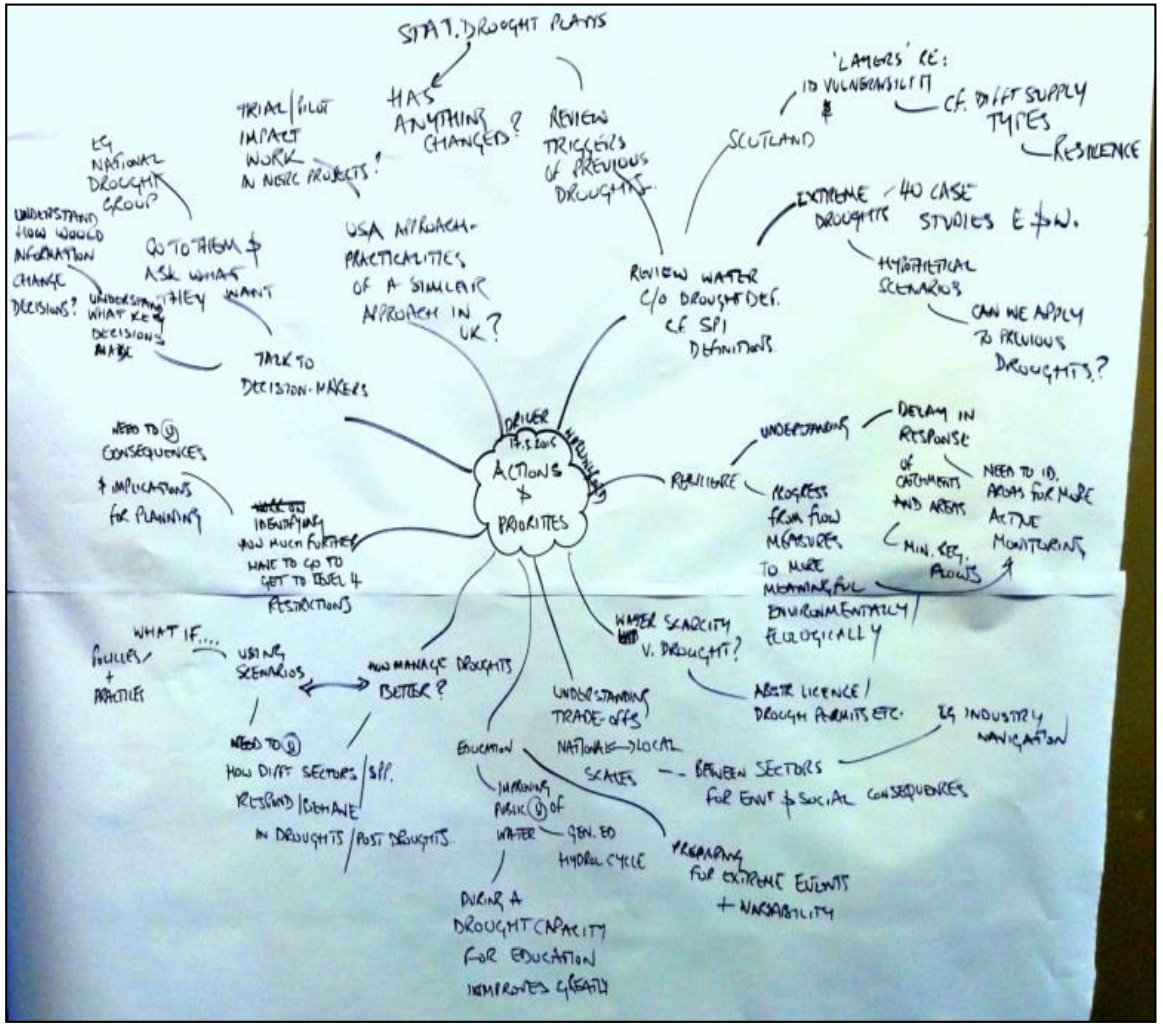
# “What should a M&EW system look like in the future in the UK?”



# “What should M&EW of the future look like?”

- **Types of droughts**: rainfall, groundwater, salmon, whisky
- **Uncertainty & risk**: cheap real-time monitoring, access, termination
- **Preparation & forecasting**: robust, accurate, restrictions, accountability
- **Impacts (vulnerabilities)**: sensitivity, local scale, layers
- **Public communication and education**: culture, interpretation
- **Politics / governance:** ownership, capacity, coordination, timing
- **Resilience**: non-stationarity, adaptation
- **Stakeholder buy-in**: social media, citizen science

# Actions and priorities




- Drought plans
- Resilience
- Water scarcity/drought
- Trade-offs
- Education
- Managing droughts
- Restrictions
- Decision-makers & decision-making
- Learning from others

# Workshop 1 Summary

- Revealed complexity of drought
- Variation of drought in context
- Variation in decision-making requirements, processes and capacities
- Hydrological measures to allow calibration of diverse impacts
- Recognise, reduce and work with uncertainty
- Accommodate resilience and vulnerability factors in M&EWS
- Link M&EW and forecasting
- Learn from USA monitoring impacts
- Develop indicators which are meaningful environmentally/ecologically
- Explore mitigation measures on drought development / progress
- Develop scenarios for droughts and post-droughts
- Clarify ownership and governance of M&EW systems

# Today in context

- Workshop 1
- Ongoing Interviews:  EA / NFU/ Canal & Rivers Trust / Anglian
- International workshops within DRIVER
- Outputs – workshop reports, briefing notes, scientific papers

# Ongoing contributions

- Portal development
- USA second workshop – December 2016
- Publications:
  - Global review of M&EWs
  - BAMS Meeting summary
  - BAMS research paper
- NERC projects and follow on funding

# Further Information

## DRIVER Workshop 1 – Report


## Bulletin of American Metrological Society Nov 2016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