Case study 4.1 - Extreme flooding and subsequent management of the species-rich plant community at North Meadow National Nature Reserve, Wiltshire

North Meadow, Cricklade is one of five sites in the UK designated as a SAC for its Lowland Hay Meadow plant community 6510 *Aloperucus pratensis-Sanguisorba officinalis*; which corresponds to Burnet floodplain meadow (MG4) in the National Vegetation Classification (Rodwell 1992). It is a National Nature Reserve, owned and managed by Natural England. Botanical, hydrological and soils monitoring have been undertaken at the site since 1998 by the Open University (Floodplain Meadows Partnership).

Recent years have seen an increase in the frequency of extreme floods. The impacts of increased severe flooding are dependent on the timing of flooding and subsequent site management. Winter flooding, as experienced in 2013/2014 when it was of longer duration than previously recorded at the site, may have limited impact provided the annual hay cut is taken the following summer to remove flood-borne nutrients. Spring flooding can have a direct impact on plant growth, resulting in a decline in less flood-tolerant species and a shift to a more species-poor vegetation community. Summer flooding has had the biggest impact on North Meadow, largely because it prevented timely hay making.

Flooding at North Meadow SSSI, Cricklade. Mike Dodd

The annual pattern of hay cutting and grazing post-flooding has a critical role to play in maintaining species diversity. Figure 4.2 demonstrates that where it is not possible to take a summer hay cut, species-richness declines more than where it is possible to take a prompt cut. Hay making removes nutrients brought in by floods and therefore subdues larger, more vigorous species. If adequate aftermath grazing is not possible, a second cut in late August for up to three years post-flooding may also help reduce soil fertility.

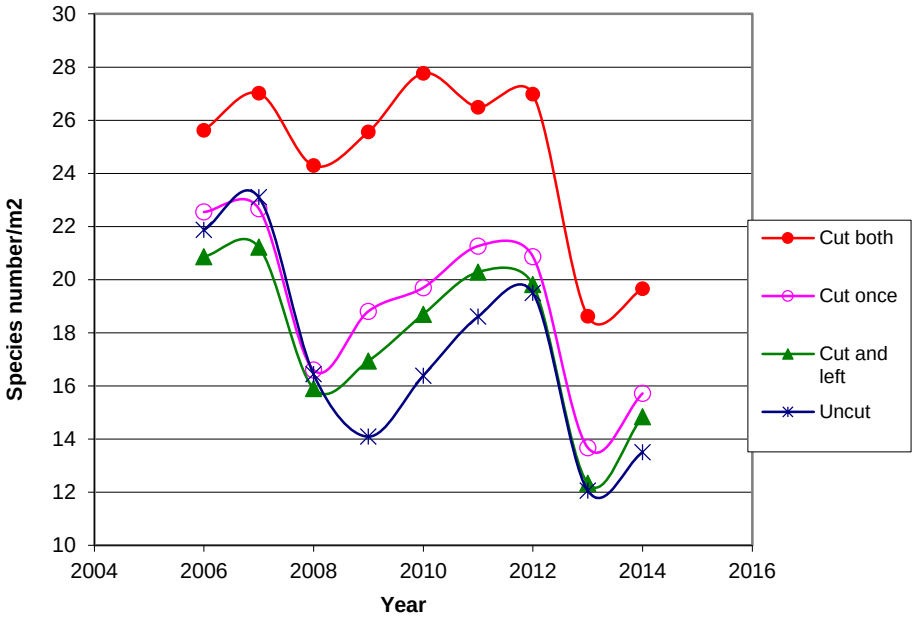

Figure 4.2 Change in species-richness at North Meadow related to hay cutting in 2007 and 2008. Data expressed as % change on preflood (2006) species-richness. Distinction is made between those plots that were cut in 2008 and had the hay removed (cut once), plots that were cut in both years, and those plots that were cut but the hay was not removed (cut and left). Uncut refers to plots that were not cut in either 2007 or 2008.

Appropriate management is critical in restoring species diversity: the plant community can tolerate more prolonged flood events if management is flexible enough to mitigate impacts, and provided summer flooding does not prevent management from taking place.

On-site water-level management is also critical to avoid the prolonged periods of inundation such as those experienced in 2012/2013. At North Meadow some of the site could not be cut because machinery could not get to parts that were dry, as other areas of the meadow were flooded.

Following the summer flood of 2012, the most species-rich Cock's-foot sub-community (MG4a) of Burnet floodplain meadow (MG4) (see Chapter 8) has been all but lost due to the lack of recovery of many of its diagnostic species including cock's-foot, crested dog's-tail, yellow oat-grass and oxeye daisy (Wallace and Prosser 2013).

After a severe summer flood, seven to ten years may be a realistic time for full species recovery. Currently at North Meadow, periods of just five years between recent floods have not allowed species-rich communities to recover fully.