

# NEWSLETTER

Winter 2015-16

**What else is there to write about other than floods and their impact on floodplain meadows? Along with the front page article, the 'Four seasons of flood' on page 2 and the 'Know Your Bents' on page 7, we have an update on our Ambassadors (page 4), dates for snakeshead fritillary counting and new web based information from Saving Our Magnificent Meadows project (page 6), and a launch month for our Technical Handbook.**

Given the Christmas floods in 2015 and the subsequent debates around how we should manage our floodplains, this edition focuses heavily on the impacts of floods on floodplain meadows. Floodplain meadows are a managed system that has developed over the centuries to benefit from floods by using their sediment as a source of nutrient to produce a valuable and sustainable hay crop. It is considered that as flood patterns change, possibly becoming more erratic, our currently lucrative crops are more likely to fail. We should perhaps be looking to history to help us decide how best to use the floodplains and think about cultivating crops that contain a range of plant species that can tolerate floods across a range of seasons and durations. The ideal would be to find one that also brought huge biodiversity benefits and was sustainable, without the need for artificial fertilisers or pesticides, just a mower and a good sense of hay management; floodplain meadows!!!

Debates have raged about wider catchment management; should we plant trees, leave it all to 'nature,' build managed wetlands, build more flood defences, let the water spill onto floodplains? As ever, there is no one solution, all catchments are different and a range of solutions need to be considered depending on the situation.

An interesting experiment in Wales, at Pontbren, has shown the potential of improving soil characteristics in the headwaters of a catchment to help moderate flooding downstream. A similar experiment is happening in the Vale of Pickering. The principle being demonstrated is that if rainfall can be absorbed by a soil then it does not run off to create a flood. Unfortunately stories around soil structure, infiltration rate and specific capacity are not easily digestible and therefore the media has tended to cover them in terms of the benefits of planting trees.

Trees do indeed help structure the soil, but so does good grassland management. Floodplain meadows for example typically have beautifully structured soil with very high infiltration rates and a large storage capacity. It is important that current debates do not get polarised



Mike Dodd



a million voices for nature



in terms of “trees good, grass bad” but the underlying need to manage soil sensitively is recognised. The current problem in our uplands (and indeed in parts of the lowlands) is inappropriate stocking with animals that are allowed to pulverise wet soil with their feet destroying the structure of the soil. Making hay to keep animals inside during the worst of the winter was the traditional way to protect soil. It has fallen out of favour in terms of farm economics, but taking a whole-system view it may well be a way forward.

Conspiracy theorists amongst us may see the hand of the re-wilding lobby jumping on the need to re-forest our uplands. Not necessarily a bad thing, but the underlying science should not be lost in the debate. In a densely populated country, flood control is needed, we therefore need to manage our soils carefully and we need to use our floodplains for their natural capacity to store water. Floodplain meadows fit the bill perfectly.

## Four Seasons of Flood - is time of year important for impact on floodplain meadows?

Ecosystems on floodplains are heavily influenced by floods. Floodplain meadows are the most dynamic type of vegetation responding to floods both directly (direct impact on plants being able to respire, photosynthesis etc) and indirectly, (changes in soil nutrients as a result of deposited silts). The time of year and duration of floods play a critically important role in determining the effect on vegetation, largely relating to meadow species phenology (changes in growth according to the season). In a seasonal climate, plant species have active and dormant phases of annual growth, depending on the temperature and the light availability

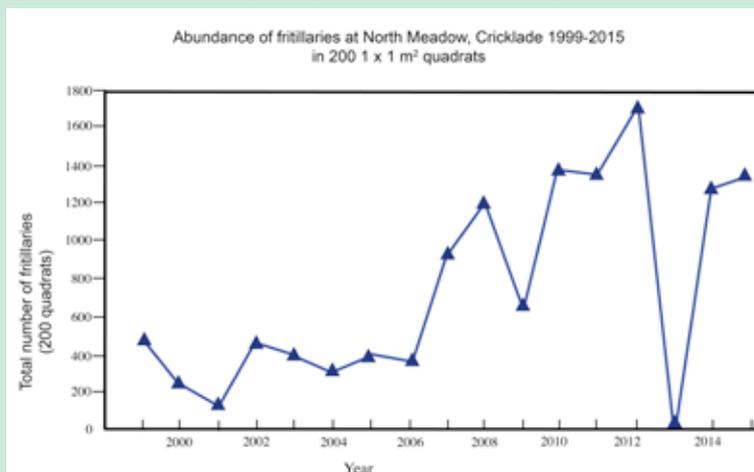


## Winter

In winter, low temperatures and short days keep most meadow plants dormant underground, or at least slow down growth processes dramatically. Big and prolonged floods typically happen in the UK during winter, however as the plants are dormant or little growing, these floods have virtually no direct effect on the plants and plant communities. If the winter temperature rises above +10 C, some species of sedges, rushes and grasses can resume growth and increase their biomass even under a flood.

The main indirect effect of winter floods is often more conspicuous: nutrients brought onto the meadow bound to sediment promote more vigorous growth, especially in grasses and sedges. This in turn, creates overall larger biomass, more dense stands and an increase in competition for light by these more robust species, which less vigorous, often annual species cannot compete against. As a result, winter floods, particularly if the weather is warm can result in a meadow flora more dominated by grasses, sedges and rushes.

However, overall species richness is not significantly affected by winter flooding, as Figure



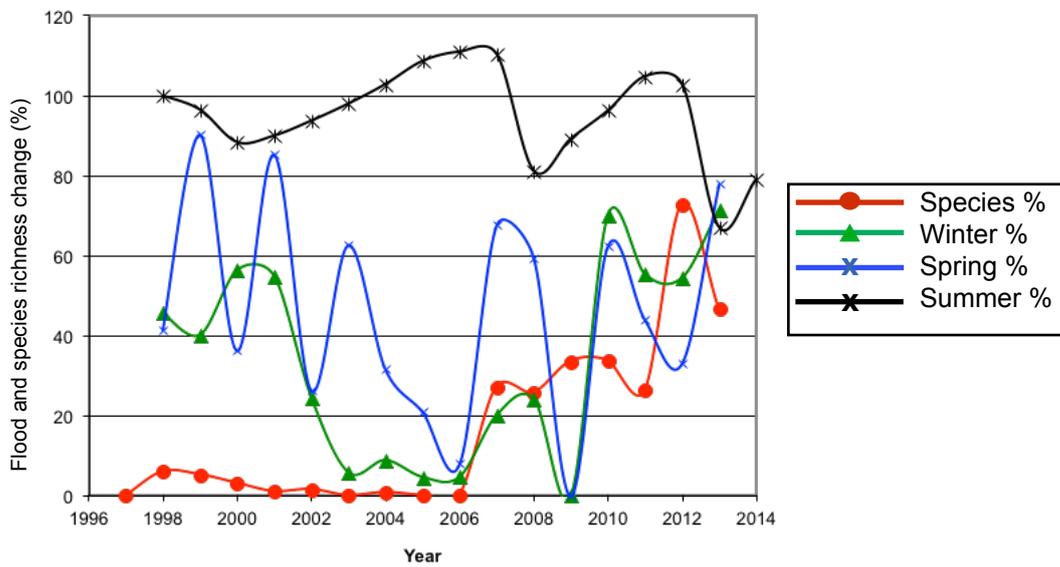


Figure 1. Duration of flooding (expressed as % of days) for different time periods based on modelled quadrat water table depths for quadrats in 130 quadrats on North Meadow, Cricklade. Winter (1 October - 28 February), Spring (1 March - 31 May) and Summer (1 June - 30 September). Species richness is expressed as % change on the 1998 value.

1 shows: in 1999 and 2001 the graph indicates that the quadrats modelled were flooded for over 80% of the winter period but subsequent species richness decline was small.

### Spring

Spring floods are less typically observed in the UK. Major perennial meadow species appear to be resistant to up to two weeks of flooding, even

after forming new annual growth in spring months. In warmer weather, when the amount of oxygen in flood water is reduced dramatically, spring flooding can have a substantial and damaging effect on sensitive

species. This effect can be long-lasting, as the new buds for the next calendar year in such plants like snakeshead fritillary *Fritillaria meleagris* start forming in spring. These can be negatively affected, reducing their chance of successful growth in the following year and can possibly trigger the dormancy of the individual plant for next 1-3 years. In spring, when consumption of nitrogen and phosphorus is particularly high, nutrients arriving on the meadow with flood sediments are utilized almost instantly, helping early growing species like cowslip *Primula veris* to develop a bigger biomass and store more nutrients for growth the next year.

### Summer

Summer floods are the most unwelcome events from a plant perspective. High summer temperature leads to less oxygen in the water and soil, resulting in death of plants, and decaying vegetation. Green algae, which can develop large patches in flood water in any season, flourishes particularly in summer floods, producing substantial amounts of nitrogen and consuming more oxygen (already in high demand). Therefore the direct effect of a summer flood on vegetation is massive and often associated with the complete death of above ground parts of the plants. If a summer flood lasts for more than 1 week it can cause long-lasting effects, with species numbers seen to decrease in the year after the flood. This is shown in Figure 1 above, where the biggest decreases in species richness follow summer flood events. As well as the direct effects described, species richness declines further where summer floods prevent an annual hay cut from being taken.



Creeping bent grass grew so vigorously on North Meadow during the Autumn floods of 2012 that it formed a thick dry mat which prevented the vegetation from growing even the following May when this photo was taken

### Autumn

Floods in the autumn, when most of meadow plants are already dormant for winter ahead, can result in an advantage to late-growing species like creeping bent grass *Agrostis stolonifera*, particularly if the species uses the water surface as an area for almost unlimited expansion. Autumn floods can



also stimulate the growth of sedges and rushes if the temperature stays above +10 C, as happened in the 2012 flood on North Meadow.

Flooding can also have a stimulating effect on seed germination of many meadow species - seedlings have a high survival rate even after remaining under a flood for 6 weeks in the autumn.

### What should be done?

Take a hay cut if you can, unless the soil is too wet (soil compaction will cause more harm in the long term than a missed hay cut). If you can't cut, graze into Autumn and as long as the soil remains dry enough. This will help break up the thatch. If there is still substantial thatch the following spring, consider a spring cut to remove litter from the site and allow vegetation to grow through. Take a prompt hay cut if the weather allows the following summer to balance the nutrient input from sediment.

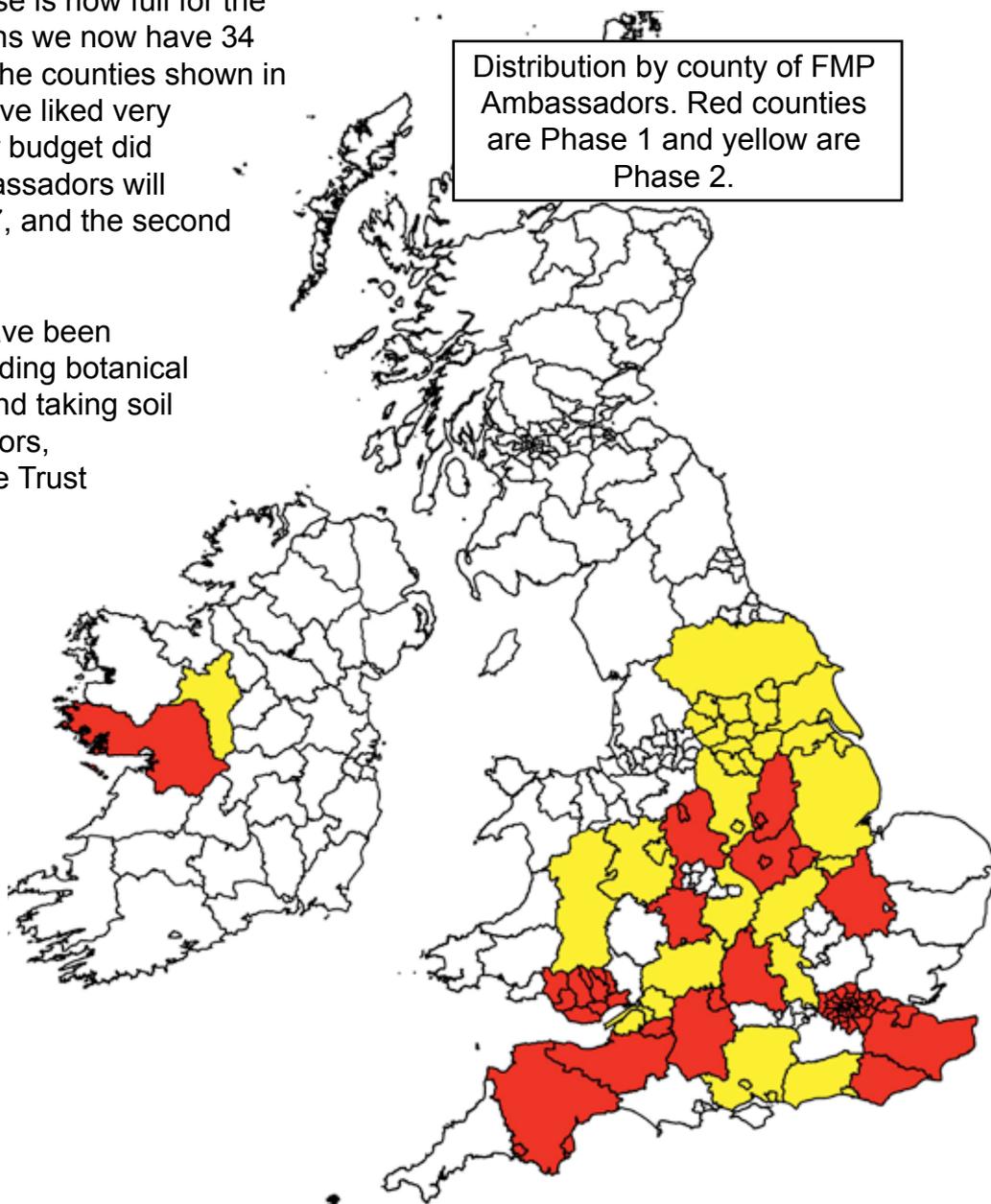
## Floodplain Meadows Partnership Ambassadors

Our Ambassadors training course is now full for the second year running. This means we now have 34 Ambassadors in total covering the counties shown in the adjacent map. We would have liked very much to appoint more, however budget did not allow. The first crop of Ambassadors will finish their training in early 2017, and the second phase in early 2018.

The first set of Ambassadors have been undertaking monthly tasks including botanical monitoring, installing dipwells and taking soil samples. One of our Ambassadors, Sam Thomas, from Kent Wildlife Trust has kindly written a short article about his experiences so far.

### My life as an (FMP) Ambassador

If you were to glance at a distribution map of floodplain meadows in the UK you might notice a big gap to the South East of the country, particularly over Kent. Widespread drainage and intensive farming or construction on the floodplains of the Rivers Medway, Stour and Rother mean the vegetation



community associated with traditional floodplain meadows has all but vanished. Any remaining patches are likely so small that they have evaded the efforts of biological recorders, despite the fantastic coverage of Kent Habitat Surveys in 2012, 2003 and 1994.

In 2014 I was working for Kent Wildlife Trust on restoration of traditional lowland meadows in the River Eden Catchment (a tributary of the sprawling River Medway) and advising landowners of local wildlife sites. It became apparent from botanical surveys that most remaining floodplain and wet meadows tended towards rank vegetation as a result of almost 100 years of changing management techniques. Having engaged in restoring several drier sites to species rich MG5 *Cynosurus cristatus* - *Centaurea nigra* grassland, I decided to apply to the Floodplain Meadows Partnership Ambassadors scheme in the hope of gaining skills, contacts and knowledge to tackle restoration of the wetter grassland communities.



Sam has been so enthusiastic about the scheme, that he has been making his own dipwells to monitor more sites.

The Ambassador scheme has been a great help, improving my identification of those tricky yet important sedges and rushes, facilitating dialogue with other organisations and individuals involved in floodplain meadow management across the country, and using soil and ecohydrology data to tailor management advice and restoration techniques to wet grassland habitats.

I have begun monitoring the hydrology of several floodplain meadow sites and hope that the data gathered will help Kent Wildlife Trust inform land managers how best to balance their management of floodplain meadows for drainage, productivity and species richness. Hopefully in the longer term we will be able to gather momentum to record, restore and maybe even recreate the scarce wet lowland meadow habitat that seems to have vanished from Kent.

**Sam Thomas**

**Landscape Scale Project Officer (and fledgling FMP Ambassador). Kent Wildlife Trust**

**WE ARE PLEASED TO ANNOUNCE THE LAUNCH OF THE FLOODPLAIN MEADOWS PARTNERSHIP TECHNICAL HANDBOOK IN APRIL 2016**

**It will be available as a downloadable pdf on our re-freshed FMP website (to be launched at the same time). Keep your eyes peeled and watch this space for launch date..**

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## New research on plant communities of fluctuating hydrology

We have a **new PhD student (Laura George)** funded by the Eranda Foundation looking at how a plant community structures itself on soil with fluctuating hydrology. This project aims to build on our knowledge of plant communities in floodplains to see how related communities come together around seasonal pools, where the soil varies between very wet and very dry within the same year. The communities growing here are often of great conservation importance (e.g. the turloughs of Ireland), and this PhD is a collaborative project with the Centre for Ecology and Hydrology (Wallingford) and the National University of Ireland in Galway. It will look at a range of sites across UK and Ireland and would provide insight into how these systems function and how they can be conserved and managed. It will also tell us something more fundamental about how vegetation responds to fluctuating soil-water regime knowledge that could be applied across all wetland types.

## New Partners in the Partnership

We are pleased to announce that we have two new members on our Steering Group. The **National Trust** have come on board and we hope to work with them looking at opportunities on their land holdings.

The second organisation is a newly formed charity called **People Need Nature**.

We use our senses to feel nature; nature influences us through our emotions and many people have a spiritual experience of nature. Yet the value nature provides to people through our senses, emotions and in our spiritual lives is often ignored. People Need Nature is a new charity which has been formed to highlight the vital nature plays in people's lives  
[www.peopleneednature.org.uk](http://www.peopleneednature.org.uk)

## Snakeshead fritillary events 2016

We are running a workshop on 24th February 2016 in Crickalde to share the results gathered from this project so far. Please let us know if you want to join us.

The Fritillary counting sites and dates for 2016 are:

Lugg Meadows (Herefordshire) 16 April 2016  
Clattinger Farm (Wiltshire) 17th April 2016  
North Meadow (Wiltshire) 21rd April 2016

## Great Fen

David Gowing (our project director), has recently been appointed as Chair of the Great Fen Advisory Group.

## Have you ever wanted to know about managing, restoring or creating a magnificent meadow? 'Save our Magnificent Meadows' Project can help...

A comprehensive online directory of advice and guidance has been launched as part of the Save Our Magnificent Meadows Project.

This new advice and guidance resource found here <http://www.magnificentmeadows.org.uk/advice-guidance> will continually updated as more information becomes available. The [www.magnificentmeadows.org.uk](http://www.magnificentmeadows.org.uk) website also includes an events diary, meadow activities for schools and families, the results of the 2015 meadows awards and photography competition and information about National Meadows Day on 2nd July 2016 (have you registered your event?)

Save Our Magnificent Meadows is the UK's largest partnership project transforming the fortunes of vanishing wildflower meadows, grasslands and wildlife. Led by Plantlife, the partnership is made up of 11 organisations, and is primarily funded by the Heritage Lottery Fund.

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# Know your bents!

The bent grasses (*Agrostis* sp) are fairly ubiquitous across floodplain meadows, but being able to identify the different species will help enormously in understanding your soil-water regime.

Three species are most widely distributed on British meadows: creeping bent grass *Agrostis stolonifera*, Common bent grass *A. capillaris*, and velvet bent grass *A. canina*. All three are weak competitors in a dense and undisturbed meadow sward. However, they are masters of colonisation of bare ground created through disturbance (*A. canina*), or shallow water/floods (*A. stolonifera*). Their rapid opportunistic expansion into such spaces is possible due to prolific and fast growth of the vegetative shoots (stolons) rooting at each node. These stolons are short-lived and the root system is shallow, which means that patches of bent grass are not very stable and can be easily replaced by more vigorous meadow species as conditions change. Bent grass seeds are tiny and disperse easily, ready to germinate two weeks after ripening which, again, supports the bent's life strategy as rapid colonisers.

The three species look similar so for identification purposes, the shape of the ligule is key. (Fig. 1). Their overall appearance, and in particular, the shapes of flower spikes in full flower, also differ (Fig. 2).

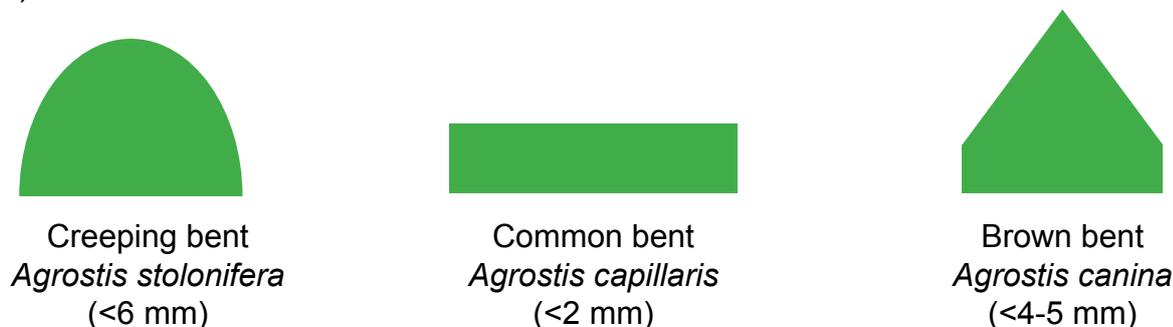


Figure 1. A schematic view of the ligules of 3 *Agrostis* sp. Please note, that the shapes of the ligules on the leaves on the main stems are more characteristic than on the tiller's leaves. Ligules of *A. stolonifera* can be confused with the ligules on the leaves of the vegetative shoots of *Alopecurus pratensis* however, the latter has erect clumps in contrast to sprawling ones in the creeping bent.

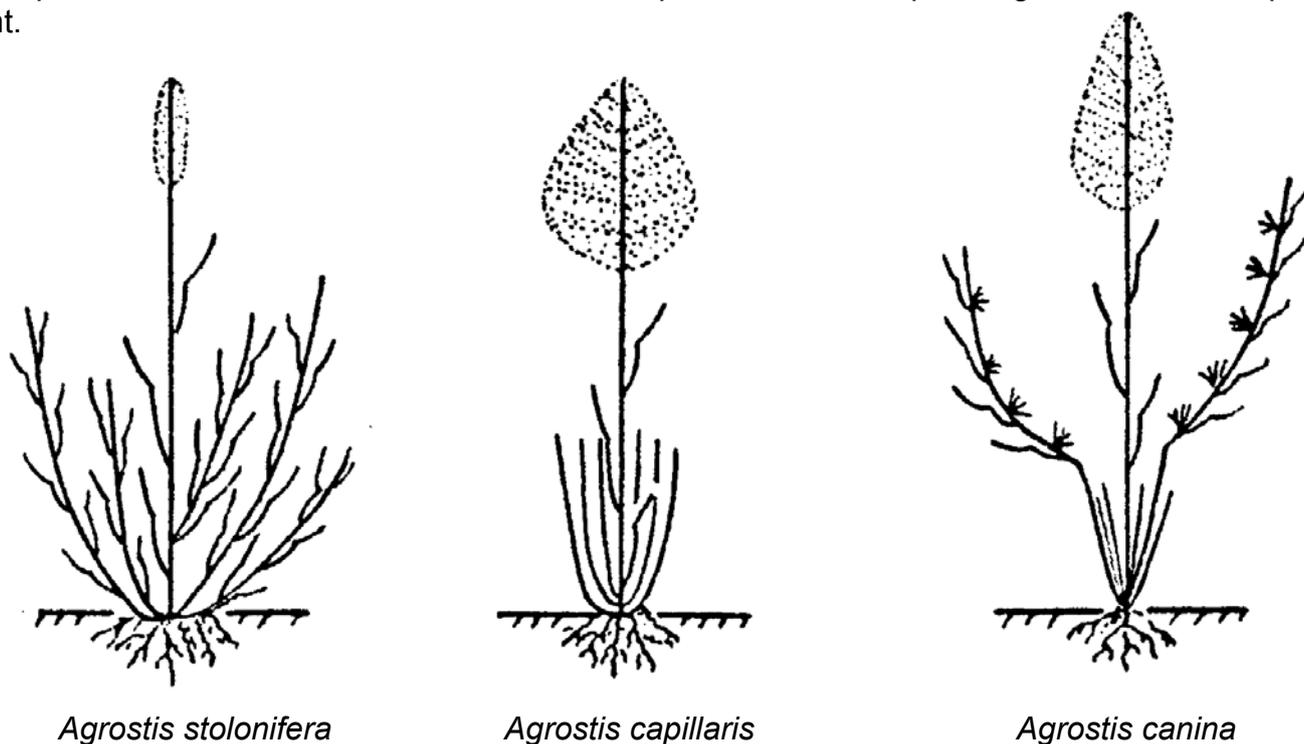


Figure 2. Shapes of *Agrostis* flowers. From Kurchenko, E.I. 2010. Genus *Agrostis* L. (Fam. Poaceae) in Russia and adjacent countries. Morphology, systematic, evolution. Moscow. 514 p

### Creeping bent

#### ***Agrostis stolonifera***

is a common grass of floodplain meadows, and is indeed a common species found across most UK habitats. It is widely tolerant of a range of fertile soils and is particularly good at exploiting disturbed environments. It spreads rapidly after floods have exposed bare soil, hence its widespread distribution in floodplain meadows.

It is found on sites that are typically wetter, able to tolerate long periods of water logged soils and tends to disappear in dryer soils (see Fig. 3).

It is particularly famous for its ability to grow on the water surface forming stolons several metres long, rooting in the water itself. The most favourable conditions for such growth appear on shallow lakes and puddles, occurring in depressions on meadows after floods have receded.

On North Meadow, Crickalade, 10 months of flooding including through August - October (during the active growing period for *A. stolonifera*) meant it could out-compete other meadow species by forming a 20 cm thick mat of stolons floating on the water surface during the flood, covering hundreds of metres of the meadow. Very few meadow species can take advantage of such prolonged floods as seen on North Meadow in 2012/13 and 10 months proved too much even for *A. stolonifera*, which died, leaving a rotting mat of vegetation on the water surface. Such species that can cope with such flooding include sedges and rushes which are evolutionarily adapted to waterlogged and flooded conditions and often called 'hydrophytes'.

The majority of other meadow species suffer severely from the lack of oxygen if floods happen during warmer seasons, and have their growth suppressed.

**Common bent grass *Agrostis capillaris*** tends to be found on more acidic grasslands, often with red fescue, *Festuca rubra* and can tolerate heavy grazing pressure due to its ability to produce very high densities of small tillers close to the ground surface. As for creeping bent, it can rapidly spread forming extensive patches. It is tolerant of more soil drying than creeping bent (see Fig. 3), and less tolerant of soil waterlogging. So common bent tends to be found on sites less frequently flooded compared to creeping bent.

**Brown bent grass *Agrostis canina*** is a low growing, stoloniferous wetland grass found on infertile, acidic, peaty soils. Can make inroads into clumps of soft rush and may form floating mats in peaty pools rooting from the bank. It can also form monocultures in shady environments.

