Information and Advice note

Version 2 –
December 2002

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Re-wetting grassland to benefit birds.

Introduction

Several species of wetland bird of conservation concern, notably waders, breed on farmland. They may nest in wet grassland, in-bye pasture or marshy areas. However, drainage and agricultural improvement of grassland to provide better grazing and forage has greatly reduced suitable areas for feeding and nesting birds. An opportunity to offset some of the declines in wetland birds on farmland is available by raising water levels, or 're-wetting', in order to re-create wetland habitats. Waders have specific requirements for nesting and feeding, and their chicks require a supply of high protein invertebrate food during the breeding season. A rich supply of insects will also help other birds such as Reed Bunting and Yellow Wagtail, which rely heavily on insect food for their chicks. Table 1 lists the requirements of the species likely to benefit from raised water levels.

This Information and Advice Note provides guidance on how to set about re-wetting farmland in order to create habitats of value to wildlife.

Table 1: Birds of conservation concern likely to benefit from re-wetting of farmland.

Species	BoCC* Status	Requirements for nesting	Requirements for feeding
Curlew	Amber	Tussocky damp grassland or heathland.	Pastures, damp fields, particularly with wet flushes.
Lapwing	Amber	Short grass (0-12cm) with some tussocks, spring tillage or bare ground	Short vegetation and wet mud in damp grassland and water margins,
Redshank	Amber	Short (5-15 cm) damp grassland with tussocks, close to standing water.	Damp grassland, marginal vegetation, mud and shallow pools.
Snipe	Amber	Wet pastures and boggy heaths with a tussocky sward of 10-30 cm.	Soft damp ground, or shallow muddy bottomed pools, close to cover.
Oystercatcher	Amber	Short grassland, bare ground or shingle banks, all with open views.	Short grassland, and marginal vegetation with soft damp ground to probe for food.
Teal	Amber	Tussocky marsh vegetation near shallow water.	Aquatic invertebrates and weed seeds in shallow, muddy pools.
Shoveler	Amber	Tussocky marsh vegetation near shallow water.	Aquatic invertebrates and weed seeds in pools.
Water Rail	Amber	Tall dense clumps of marsh vegetation in shallow standing water.	Varied, mainly invertebrates but also small fish, amphibians, berries and shoots.
Yellow Wagtail	Amber	Damp meadows or cereal fields	Insects from grazed pasture and short, sparse marginal vegetation around pools.
Song Thrush	Red	Trees, hedges or scrub.	Invertebrates, especially earthworms and snails in damp grassland, and, in autumn, fruit.
Grasshopper Warbler	Red	Dense ground cover, including tall marshy vegetation.	Mainly insects picked from the ground or from vegetation.
Starling	Red	Trees, buildings or nest boxes	Insects and seeds from grazed pasture and short, sparse marginal vegetation around pools.
Tree Sparrow	Red	Holes in trees, farm buildings and nestboxes.	Adults mainly feed on seeds, insects and spiders are fed to the chicks.
Reed Bunting	Red	Tall, marshy grassland, ditch edges, crops and set-aside.	Insects and weed seeds.

*BoCC= Birds of Conservation Concern: 2002-2007 (RSPB) Red = high concern, Amber = medium concern.

Assessing the potential for re-wetting.

The wetness of an area of land through the year is the result of the interactions between rainfall, summer moisture loss through evapo-transpiration (combined loss from both vegetation and open water surface) and the soil/geological conditions. In natural situations, the resulting vegetation, be it wet grassland, marsh or swamp for example, will be the community of plants best suited to the conditions. Where re-wetting is considered, the aim is to combine water control and appropriate land management to produce the desired wetland habitat, usually wet grassland. Re-wetting should only be attempted in suitable areas and it is therefore important to consider all the issues before proceeding. Where necessary, specialist advice should be sought. Table 2 identifies the issues that need to be considered.

Table 2 Key issues to be considered before re-wetting farmland.

Issue	Rationale	Points to consider
Geographic location	Breeding waders have been lost from large areas of the country. Newly created habitat may be only slowly colonised by target species.	• What are the target species? They should ideally be present in the locality to enable colonisation.
Site location and size	Surrounding habitat, site size and access are important in achieving successful restoration.	• Is there a history of wetland habitats in the locality? Colonisation will be quicker if adjacent to other wetlands. • Is the site large enough to meet the objectives? Larger sites will attract more species and offer greater flexibility. • Can the appropriate grazing or cutting management to maintain the ideal habitat be provided? • Is the surrounding land-use appropriate? Ideal sites will be unenclosed and relatively free of hedgerows and trees.
Hydrology and soils	Control of water is critical to achieving results. Adult waders and their chicks feed in damp soil and shallow water with muddy margins.	• Are the soils suitable? Free draining soils are generally unsuitable unless the water table is close to the surface. • Can water levels be maintained throughout the spring and early summer? (water control structures will be needed in many cases). • Is there a clear understanding of the water flows entering and leaving the area? • Are land levels and field topography suitable? • Does altering the drainage affect other land? Consult with appropriate authorities to ensure there is no conflict.
Potential conflict with other features.	Re-wetting should NOT be considered where there is a conflict of interest, for instance where there is: • Environmental • Historic and archaeological, or • Cultural landscape interest.	• Does the land have existing conservation value; eg species rich flower meadow, or use by other birds (corncrake, black grouse), that may be damaged by raised water levels? • Is the land a Scheduled Ancient Monument, other archaeological site, or ridge and furrow field system? • Are there existing public rights of way?

Site history

Many farms will have held patches of wet grassland in the past, but most will have since been drained. Where habitat enhancement is proposed, the area targeted should generally have been historically wetter. Knowledge of the past management history, notably drainage, will be valuable and in some cases, simply reversing or controlling the outflow of water from a drainage ditch will bring the desired result.

Knowledge of habitats and species present in the locality, both past and present, should be used to inform decisions on the desired end-result. Where the farm still has grasslands that hold high water levels throughout the spring, then simply applying the appropriate management should ensure that they provide the right habitat structure for breeding waders. It would not be desirable to change the land-use on existing wet pastures but re-wetting may enable favourable conditions to be extended.

Understanding soils

Understanding how water will behave in a particular soil type and the rate at which it will move through the soil (the hydraulic conductivity) is important in any re-wetting proposal. Water moves faster through soils composed

of large particles (sand or peat) and well-structured soils (eg some clays which have not been ploughed). Water moves slower through soils composed of small particles (clay or silt), particularly where the soil structure is poor. Some clays may be virtually impermeable. Weathering, plant root action and soil invertebrates will, over time, act on unstructured clays to create small cracks, increasing water retention and hydraulic conductivity in the process.

When considering drainage, and therefore re-wetting, soils may be grouped as follows:

- **Free-draining soils** are permeable, they are unlikely to have been wetland in the past, or to have been drained. They are mostly composed of the larger particled sands and well-structured clays. Wetland habitat creation is unlikely to be desirable or successful on such soils, at least not without a great deal of effort.
- **Ground water gleys** (soils permanently or periodically water-logged) are usually composed of similar particles (sands, peats and well-structured clays) and are also permeable, but may remain wet all year if there is a high groundwater table. In general, they may be made wetter by installing water control structure, such as sluices, to retain high groundwater levels.
- **Surface water gleys** tend to be soils with a low permeability, such as those composed of clays and silts. They are often waterlogged in the winter but dry out in summer. Gleys in an arable situation would usually be drained with tile drains emptying into a ditch and it is possible to increase wetness by blocking outflows. This will raise water levels in winter and retain higher levels into spring. However, additional water will usually be required to retain summer wetness.

Assessing the soils within the project area is desirable. This may be achieved by digging a pit 1-2 spade widths and 1-2 spade depth and looking for the different layers of soil present, the structure and composition of the soil in each, and the presence of the water table. This should be repeated at several locations to assess variability of the soils.

Topography

A basic requirement for a re-wetting project is a field with the right topography to hold water, and therefore an understanding of the topography of the proposed land for re-wetting is a vital component of success. On a large scale, a topographic survey measures the height of ground level, water level and water control structures, thus providing information on slopes, flows and likely areas of flood. This may be achieved using sophisticated levelling equipment. However, the simpler method of recording a 'winter puddle' map, perhaps assisted by the placing of a few sandbags in a ditch to allow water to back-up, will allow the water to do the levelling work.

On a smaller scale, ground-level variation within a field can affect the plant community and water regime in directly adjacent areas, for example within ridge and furrow grassland, or on land with a complex pattern of rills. Such variation, best judged by eye, is extremely important in achieving ideal conditions for wet grassland species. Fields with a varied topography will enable the creation of a mosaic of wet feeding areas, drier nesting areas and a gradation in-between that will dry out at different times throughout the spring. This is also important as some crucial invertebrate food sources, such as earthworms and leatherjackets, will be lost in areas where the soil is inundated for long periods.

Water supply

Restoration of wetland habitats usually depends on raising water levels, so the availability of water is a crucial factor. There are a variety of potential water sources and the supply of water will be dependant on local climatic factors. Water input will depend on rainfall, surface water (river/stream flows) and groundwater levels. Water loss will depend on evapo-transpiration and seepage (groundwater seepage, drainage or runoff).

Groundwater sources may be utilized through the inflow of water from springs or seepages or by installing water control structures on outflows to retain the groundwater height. Surface water can be re-directed from ditches or streams to the desired location. Again, water control structures may be required. Consider any likely impacts created up-stream by blocking or diverting drainage and consult with the necessary statutory agency (eg The Environment Agency in England and Wales) for further advice.

In potentially complex situations, it is advisable to calculate a water budget using local climate and drainage data from the Meteorological Office (MAFF, Technical Bulletin Number 34, Climate and Drainage, HMSO, London). Variations in climate must be identified for the local situation to ensure that rainfall and evapo-transpiration are sustainable and appropriate to the proposed re-wetting scheme. However, this may not be straightforward as allowance will need to be made for the different evapo-transpiration rates of wet grassland

and open water. In addition, seepage losses will depend on the hydraulic conductivity of the soil, water levels and the ground topography. In most cases, specialist advice should be sought.

Implementing the project.

Any re-wetting should be undertaken gradually so that the response, both in terms of the habitat creation and the farming consequences, can be assessed and any problems addressed before it is undertaken on a large scale. Although larger areas are preferable, there is no minimum size of project, even small-scale re-wetting by blocking a few field drains will provide some benefit. Snipe may nest in 0.2 ha of tussocky grassland with shallow pools, although predation rates in small patches are likely to be higher.

Once the key issues such as soils, topography, water supply and site history have been considered and proved satisfactory, the project can be implemented. The following sections look at managing and maintaining water levels, and creating features within the fields.

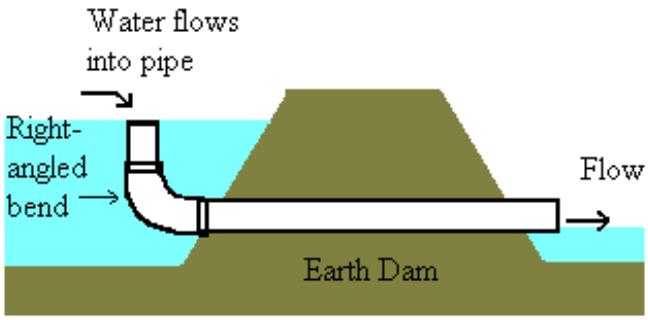
Managing water levels

Re-wetting may be undertaken in a range of soil and hydrological conditions and the simplest schemes are often no more complicated than reversing or reducing the drainage function in a particular area. In many areas with a wetter climate, the rainfall is sufficient to keep sites wet into June, and reducing the rate of run-off is sufficient. Assess the soils and drainage patterns for the area and if necessary, block any drains that take water away or redirect others to drain into it. Use of the least productive pastures will mean less of a loss for the farmer and may provide the best results.

In drier locations, it will be necessary to direct water to a chosen location and/or install water control structures to reduce losses. Alternatively, there may be an opportunity to create a bund (low bank) to retain water. Water control structures, such as sluices, enable the ability to control the inflow or outflow of water and thus the water level in the field. In the permeable groundwater gleys, sluices may be used to maintain groundwater levels and thus soft feeding conditions over the field. However, seepage is likely to be a key issue. In the less permeable surface water gleys, high ditch levels to maintain shallow surface flooding in low points in the field are critical. The provision of shallow water and muddy margins are important to feeding waders and without control the grassland may dry out too soon in early dry weather, while a wet spring may result in levels remaining too high.

The most cost effective sluice is likely to be constructed with a length of plastic piping, either rigid pipe with a swivel end or flexipipe, laid through an earth dam in the outflow ditch or bund (Figure 1). Each end extends beyond the dam, and the upstream end is held at the desired level. Flexipipe will normally need weighting to keep the lip submerged and require a length of rope to hold the upstream end at the desired level. Adjusting the upstream end (by swivelling the pipe or raising or lowering the rope) will set the desired water levels. Other options are available, for example: drop-board sluices. These are more costly in time and resource to install. Details of these can be found in *Reedbed Management for Commercial and Wildlife Interests* (see further reading).

Figure 1 Diagram of pipe sluice.



Bunds need to be carefully engineered so that they are stable and impervious. Construction is easier in areas with loamy or clay soils and the bund should be keyed into an impermeable substrate. They should be set well back from the edges of ditches to reduce seepage losses and gentle profiles are advisable to enable mowing of any colonising rank vegetation. If a bund is necessary, aim to locate it appropriately within the landscape.

The water regime

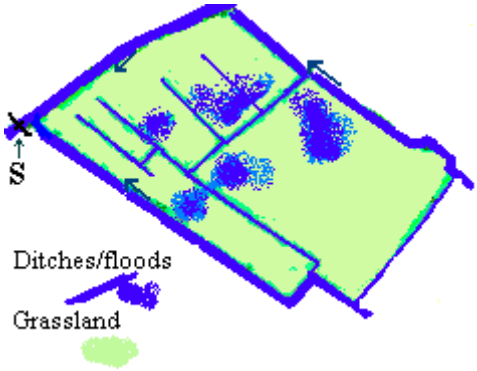
Water regime describes the combination of water table depth, the length of time that depth is maintained and at what time of year. Shallow pools within the fields are beneficial as they are ideal feeding habitats for all species. However, the presence of pools is only essential for Redshank, for other species maintaining high summer ground water levels where possible will suffice. Extensive and prolonged flooding may attract birds in the short-

term but ultimately critically reduces the abundance and variety of soil invertebrates. In practice, in a field with variable topography and a high water table, surface water that covers a small percentage of a field (around 5%) will provide adequate open water and suitable soil conditions for a substantial proportion of the field.

The water level should naturally reduce slowly during the spring through evapo-transpiration. Alternatively, depending on weather, let water out slowly to achieve the desired condition. Beyond July, the water table should be taken down to enable agricultural operations to be undertaken on the fields. A summary of a regime to meet the requirements of most species is as follows:

- **Dec-Mar.** High water table with 'splashy' conditions over the field and/or shallow flooding from 1 to 30 cm over up to 30% of the field. Allow water levels to fluctuate to avoid stagnation.
- **Mar-May.** High water table, at field level over 30% of the field and/or shallow flooding on 5-10% of the field,
- **May-July**. Water table within 20cm of field level on average, shallow pools shrinking with muddy edges.
- **July-Dec.** Water table dropping to at least 40 cm below field level. No pools. Grassland dry enough for management.

Figure 2. Diagrammatic representation of drainage channels and extent of early spring flooding in a wet grassland field.
S – sluice. Arrows show flow direction.



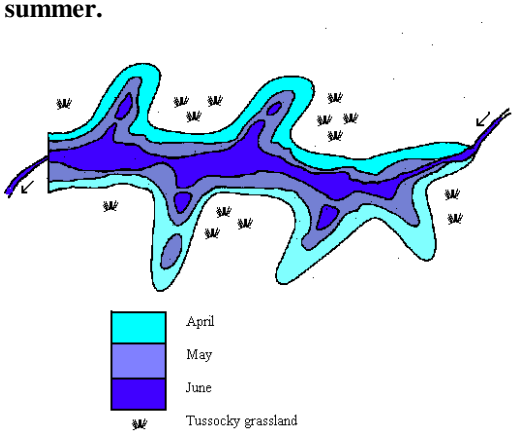
Wader 'scrapes'

When re-wetting fields that do not have a varied topography, it may be appropriate to excavate a wader 'scrape' or a shallow ditch along the contours of the field, or re-profile existing ditches to create areas of shallow water. Where scrapes are created, sculpting a convoluted, or sinuous, edge will increase available feeding area and is likely to provide shelter in windy weather (see Figure 2). Ideally locate in a natural depression, otherwise, earthmoving, undertaken during a dry period, may be required to achieve the correct depth. Water depths in the scrape in early spring should typically be between 0–25 cm over half of the area and the remainder 25-50 cm. A very gentle slope with an uneven finish will allow shallow wet pools to remain longer within the scrape and allow a gradual exposure of the feeding surface. The water regime should follow that described above.

In Figure 3 the outer line represents the extent of the open water in early April. The middle line represents the shrinking area of water by the end of May and the inner by the end of June. Annual weeds will have grown on the mud and set seed. By August the scrape should be all but dry and ready for management.

Any spoil material that is the by-product of excavating the scrape should ideally be removed away from the area. Alternatively, the spoil could be used to construct a bund around the downstream edge of the scrape.

Figure 3: Diagram of scrape, showing receding area of water throughout spring and early summer.



Habitat maintenance.

Wet grasslands are the products of agricultural management, usually by grazing, mowing or haying. Such management halts the natural succession to coarser vegetation types such as scrub. The timing of management, its intensity and frequency all influence the habitat. All resulting habitats will support wildlife, but they will be

ideal for some species and wrong for others, the trick is to achieve the desired habitat for the target species (Table 1).

For breeding waders, the sward structure is critical. Lapwing require bare ground or very short vegetation (0-12cm), while Snipe prefer a longer, tussocky sward of 10-30 cm. Ideal management would aim to create a mosaic of shorter and longer swards, perhaps within different fields. Small areas of the wettest land, or some of the ditch margins, may be left to develop taller swamp vegetation of sedge or reed. This will benefit birds such as Reed Bunting and Water Rail.

Grazing with livestock, usually cattle, at a moderate intensity is ideal as it a) creates a mosaic of tussocks and short turf used for nesting by a range of wader species, b) augments the invertebrate population of the margin through dunging. To avoid trampling of nests, stock levels should not exceed one cow per hectare between mid-March and June. Heavy grazing from late summer onwards will restore the required sward heights for the following year. If grazing is not possible, cutting will be essential. Cutting should be timed for suitably dry periods after the end of the breeding season, usually between August and October. Expect to cut at least twice per year if grazing is not possible

Where re-wetting takes place on naturally damp land, rushes may increase rapidly. A limited rush cover is beneficial but in excess will have an adverse impact. Aim for no more than 20-30% scattered rush cover and manage by topping (and grazing the re-growth) when cover increases beyond this.

If wader scrapes have been created, re-flooding in winter, following summer/autumn management will kill colonising perennial vegetation such as grass. Annual weeds, which germinate each year on the muddy margins as the water retreats, are important as they provide a large supply of seeds for dabbling duck as well as number of passerines such as Yellowhammer, Reed Bunting and Linnet.

Further reading.

Benstead, P, Drake, M, Jose, P, Mountford, O, Newbold, C, Treweek, J, (1997) *The Wet Grassland Guide, Managing floodplains and coastal wet grasslands for wildlife*. RSPB
Gregory, RD, Wilkinson, NI, Noble, DG, Robinson, JA, Brown, AF, Hughes, J, Procter, DA, Gibbons, DW, Galbraith, CA (2002), *The Population Status of Birds in the United Kingdom, Channel Islands and Isle of Man: an analysis of conservation concern: 2002-2007*, RSPB
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A complimentary set of Information and Advice Notes on the Ecology and Conservation for tree sparrow, yellowhammer, corn bunting, turtle dove, linnet, lapwing and yellow wagtail, all listed in Table 1, can be obtained from RSPB Conservation Management Advice. There are also available, leaflets for lowland and upland farmland habitats and species. Contact: richard.winspear@rspb.org.uk or telephone: 01767 680551 or visit www.rspb.org.uk/farming.