

Section 6

Flood Defence, Land Drainage and Water-level Management

Flood defence and land drainage activities are undertaken in the Avon cSAC catchment to ensure that water levels within the main river and former Internal Drainage Board (IDB) drains are compatible with existing land use. These activities can have a significant effect on the River Avon cSAC/SSSI and Avon Valley SPA/Ramsar/SSSI.

The implementation of Water Level Management Plans (WLMPs) is essential in ensuring wildlife gain in the cSAC and SPA. However, care must be taken to ensure that measures required to benefit the Avon Valley SPA do not adversely affect the cSAC interests, and vice versa.

New flood-defence schemes should provide integrated solutions to reducing flood risk while delivering net wildlife gain.

Particular attributes related to flood defence, land drainage and water-level management activities are relevant to the species and habitats of the River Avon cSAC, and are shown in Table 13.

Table 13. Relevant attributes related to flood defence, land drainage and water-level management.

Attribute	Measure
River Form	River channel form assessed by geomorphological survey
Habitat structure	Distribution and area of spawning habitat
	Distribution and area of nursery
	Extent of gravel/pebble-dominated substrate
	Presence of adult holding areas
	Area of emergent riparian vegetation
	Extent of submerged and marginal plants
	Extent of submerged higher plants
	Extent of bankside tree cover
	Extent of high canopy tree cover
	Extent of refuges
	Extent of woody debris
Extent of bankside tree cover with submerged tree root systems	
Access	Artificial obstructions
Water table (rivers, fens)	Depth of water table below ground level. Vegetation indicators of drying out
Extent and composition of <i>Ranunculus</i> communities	Mapping of extent and composition of <i>Ranunculus</i> communities at representative sample stretches
Reproduction of <i>Ranunculus</i> communities	Annual spot-checks in June/July. Information will also be obtained from mapping of sample stretches for extent and composition Audit Weed Cutting Code of Practice every three years (EA and EN)

6.1 Environment Agency Operational Maintenance

The Environment Agency undertakes management along designated main rivers in a manner appropriate to adjacent land use, in order to alleviate the flooding of property, and to ensure that flood-alleviation schemes provide protection up to their design standard. Operational maintenance activities include tree removal, bank repair, control of hatches, maintenance and repair of flood banks and cutting the *Ranunculus* community (known as weed cutting). In some cases, dredging is undertaken to maintain the carrying capacity of the channel, but this is far less common than in the past.

Routine maintenance activities related to flood defence, including removal of blockages and debris, de-silting and weed cutting, were set out in 1993 River Avon (Salisbury–Christchurch) Operational and Maintenance Plan, agreed by English Nature and the Environment Agency. The subsequent cSAC, SPA, Ramsar and SSSI designations of the River Avon and Avon Valley mean that this plan is currently under review.

The Environment Agency is both a competent and relevant authority (see Section 1.6) with respect to the River Avon cSAC, and Avon Valley SPA/Ramsar site. As a competent authority the Environment Agency has a duty to ensure that in its own operations and authorisations, and the consents it issues, do not have a significant effect on the cSAC or SPA/Ramsar site. Under the Wildlife and Countryside Act 1981, the Environment Agency also has a duty to further the conservation and enhancement of features of interest on all SSSIs, and must consult English Nature if undertaking work or determining an authorisation that may damage the SSSI. It is essential that the revised Operational and Maintenance Plan fully takes into account the cSAC interests and is rigorously adhered to by the Environment Agency and any contractors carrying out work on its behalf.

Action underway	Delivery		
	By whom	Mechanism	Date
Revise the River Avon Operational and Maintenance Plan to take account of the cSAC, SPA, Ramsar and SSSI designations and the Wildlife and Countryside Act.	EA	Internal review	2003/4

6.1.1 Aquatic Vegetation Management

Downstream of Salisbury, aquatic vegetation management, or weed cutting, is currently undertaken by the Environment Agency for land-drainage purposes. Weed cutting is also carried out upstream of Salisbury, primarily for fisheries management purposes (see Section 5). All weed cutting in the Avon Valley SSSI is included on the OLDS list, so it is necessary for the Environment Agency to obtain English Nature’s assent for the works. In the upper River Avon system weed cutting for fishery purposes is an exemption, see Section 5.3.1).

Because the Environment Agency weed cuts are carried out mechanically, there is potential for this activity to significantly effect the *Ranunculus* habitat, and to disrupt the habitat of bullhead, lamprey, salmon and Desmoulin’s whorl snail. Depending on the extent of weed cut, the implications for the cSAC include reduced cover for fish, removal of invertebrates and potential impacts on water quality. However, some level of cutting may be required for flood-defence purposes, and to ensure that the grazing requirements of the ESA scheme can be fulfilled. A careful balance must be struck whereby weed cuts are only undertaken to achieve appropriate water levels and management in the ESA.

An audit of weed-cutting activities in the Avon recommended that the Weed Cutting Code of Practice set out in the Operational and Maintenance Plan required updating to take into account the Environment Agency’s responsibilities under the Habitats Directive and WCA (Menendez 1999).

A revised Weed Cutting Code of Practice and consenting protocol is under development and will include

criteria that must be fulfilled before a cut can be approved. The draft consenting protocol between the Environment Agency and English Nature includes criteria for instigating cuts, as detailed in Appendix E. The draft protocol was trialled in 2002 and is being reviewed for 2003. Requests for Environment Agency weed cuts are usually in June/July to allow haymaking or silage cutting, and in autumn to allow grazing. The revised Code of Practice must consider flow rates, water levels, weed growth, and wetness of adjacent land (see weed-cutting criteria) in determining whether a cut may be instigated. In addition, there must be a need to cut, which will only be demonstrated if weed cutting will contribute to conservation of the Avon Valley; for example to allow appropriate grazing regimes in the ESA.

Currently, observed flow as a proportion of long-term average flow is used to determine the percentage of weed to cut. This approach assumes that when flow is high, water levels are elevated. However, in years when weed growth is low, water levels can also be low even though flow rates indicate a need to cut. To avoid excessive cutting in this situation, water levels must also be used to determine the proportion of weed cut. As a guide, a minimum of 25% of floating *Ranunculus* should be retained per 100m stretch of river.

Once the proportion of weed to cut has been decided, the pattern of cut is selected. The type of cut along any particular reach should perhaps be varied annually, as using a fixed type can alter channel morphology and vegetation.

It is likely that the Code of Practice will evolve over several years, and will need to be regularly reviewed to take into account changes in land use and climate. It is recommended that the potential effects of mechanical weed cutting on the cSAC are described in the revised Code of Practice. Consideration must be given to monitoring the effect of weed cutting on water levels, and the cSAC/SPA features must be monitored to assess the effectiveness of the works and the impact on the wildlife interests. This monitoring information would inform subsequent reviews of the Code of Practice.

Weedcutting is also required in the vicinity of Environment Agency gauging structures to ensure that they conform to British and international flow-measurement standards and therefore measure flow accurately.

6.1.2.1 Practical considerations

In addition to the revising the Code of Practice, the following practical considerations should be made with respect to the cutting, removal and disposal of the weed:

- Availability of suitable weed-cutting equipment. Where the channel is narrow and only a small proportion of weed is to be cut, it is difficult for large boats to cut with the required precision to prevent overcutting. The Environment Agency must ensure that suitable equipment is available to carry out the level of cutting required.
- Location and maintenance of booms. At locations where the nearest boom site for collecting cut weed is some distance downstream, additional cutting is carried out to enable the free passage of the cut weed to existing boom sites. Where this happens regularly, alternative arrangements for collection and removal of weed should be investigated, including possibilities for reopening disused boom sites or opening new ones.
- Disposal of weed. If cutting is undertaken outside the period when weed is removed at boom sites, following removal, cut weed should be temporarily deposited on the bank (to allow invertebrates to return to the river) before removal off site. The Flood Defence Conservation Requirements for Watercourse Maintenance Works (1998) state that in the long term, cut weed should be disposed of at a location where runoff cannot pollute watercourses, or smother important wildlife habitats. The Environment Agency must ensure that disposal arrangements in the Avon catchment satisfy this requirement.

Action underway	Delivery		
	By whom	Mechanism	Date
Develop and agree a revised Weed Cutting Code of Practice in conjunction with the development of Water Level Management Plans.	EA, EN, DEFRA	Consultation	2003+
Action required			
Incorporate the revised Weed Cutting Code of Practice into the Operational and Maintenance Plan once English Nature, the Environment Agency and ESA officer are satisfied with the new procedure.	EA, EN, DEFRA	O & M plan	2003
Review the Weed Cutting Code of Practice regularly and amend the Operations and Maintenance Plan accordingly,			2003+
Consider appropriate monitoring to determine changes in <i>Ranunculus</i> communities on the river in response to Environment Agency weed cuts and to determine if the cuts achieve their water-level management objectives.	EA	?	?
Have regard to the suitability of weed-cutting equipment and collection, removal and disposal of weed.	EA	O & M plan	2003+

6.1.2 Maintenance of ex-Internal Drainage Board Drains

The Environment Agency is responsible for maintaining ex-Internal Drainage Board (IDB) drains in the lower Avon floodplain. Although the drains are not part of the River Avon cSAC they may provide important habitat for lamprey and bullhead, which are likely to favour the flow conditions in the drains over those in the main River Avon. The maintenance of ex-IDB drains was reviewed by Menendez (1999) and found to be damaging to the designated floodplain interest features of the Avon Valley. The Environment Agency is now taking steps to revise the maintenance regime of ex-IDB drains. This work will be linked to the implementation of WLMPs and ESA agreements and will need regular review to ensure compatibility with both.

Action underway	Delivery		
	By whom	Mechanism	Date
Develop a revised maintenance regime for the ex-IDB drains, compatible with the adjacent land use to ensure that this activity does not damage the interests of the Avon Valley SPA/SSSI/Ramsar site or the cSAC, and promotes enhancement of biodiversity interest where appropriate.	EA, EN, DEFRA	Review of ex-IDB drain maintenance	2002/3

6.1.3 Debris Removal

In fulfilling its flood-defence and land-drainage duties the Environment Agency may remove debris. This may include material of importance to riparian fauna for shelter, especially coarse woody debris such as fallen or overhanging trees. A geomorphological study of the River Wylfe (Section 9.1.2) suggests that

coarse woody debris contributes to localised variations in flow and habitat and is potentially an important factor in maintaining or creating habitat diversity in the cSAC. Where fallen and overhanging trees do not present a risk of flooding or to infrastructure there should be a presumption in favour of leaving them in place and securing if necessary.

Action required	Delivery		
	By whom	Mechanism	Date
Leave coarse woody debris in place where this will not increase the risk of flooding or damage to infrastructure.	EA	O & M plan	2003+

6.2 Water Level Management Plans

The DEFRA (formerly MAFF) Water Level Management Plan (WLMP) initiative provides a means by which the water-level requirements for a range of activities in SSSIs and Natura 2000 sites, including conservation, agriculture and flood defence, can be balanced and integrated. Water-level management is a key part of achieving favourable condition in the River Avon cSAC and Avon Valley SPA/Ramsar site. WLMPs are being developed with landowners in order to deliver sustainable water level management and environmental improvements.

In the lower Avon the plans aim to establish appropriate water-level management in the SPA/SSSI, reversing the decline in grazing marsh habitat, breeding waders and wintering wildfowl. The plans will take into account the needs of the SAC, but primarily focus on restoring appropriate water levels in the floodplain. In the upper Avon, the priority for WLMPs is to ensure appropriate water-level management for the SAC/SSSI, taking into account seasonal variations in flow. Enhancement of Desmoulin's whorl snail habitat in the upper Avon should only take place at locations and times when this will not impact on the riverine interests.

Implementation of the WLMPs should result in both flood risk management and conservation benefits for the Avon Valley SPA/Ramsar site and the River Avon cSAC. Further details of the WLMP initiative are given in Appendix C.

The WLMPs are essential to ensure wildlife gain in the cSAC and SPA. However, some of the measures required to benefit the Avon Valley potentially impact on the cSAC features. Of particular concern are the following:

- The construction or refurbishment of control structures has the potential to prevent the migration of lamprey, bullhead and salmon. However, it also has potential to increase available habitat for several fish species. The design of new or refurbished structures or operation of control structures should allow the safe passage of these fish. Where this is not possible, alternative routes or habitat improvements should be ensured (such as back channels, streams, ditches), or management ensured that allows access at important times of year.
- Modifications to the existing drainage system may include the reinstatement of some drainage channels. This could have negative impacts on the cSAC due to localised increases in sediment loads and extraction of water, decreasing flow, but has the potential to increase available habitat for fish species. Guidance on ditching works clearly explaining best practice should be developed as detailed in Section 3 (water quality).
- Weed cutting is an important element of water-level management in the lower Avon and must be taken into account in the Water Level Management Planning initiative. The revised Code of Practice should be incorporated into the implementation phase of WLMPs (see Section 6).
- The maintenance of appropriate water-level management is particularly important for Desmoulin's whorl snail. As part of **Life in UK Rivers**, a study to quantify the hydrological requirements of Desmoulin's whorl snail is underway. The results should be taken into consideration in the WLMPs and areas identified where there is potential to enhance habitat by

modifying water-level management. In the upper Avon, enhancement of Desmoulin’s whorl snail habitat must take into account seasonal variations in flow and ensure that flow levels for the in-river interests are maintained at all times.

Action underway	Delivery		
	By whom	Mechanism	Date
Develop and implement Water Level Management Plans to deliver wildlife gain and contribute to favourable condition in the River Avon cSAC/SSSI.	EA, EN, DEFRA, WFA, A&SRA, landowners, tenant farmers and fishing interests	WLMPs (rolling programme)	Ongoing
Action required			
Ensure that any new or reinstated water-level management structures (as part of WLMPs or other initiatives) do not compromise the safe passage of salmon, lamprey and bullhead.	EA, EN, DEFRA, fisheries and landowner interests	WLMPs (rolling programme)	2003+
Ensure the implementation of the Water Level Management Plan for the Avon Valley SPA/SSSI takes into account potential conflicts with the cSAC interests.			Ongoing
Take the revised Weed Cutting Code of Practice into account in the Water Level Management Planning initiative.			2003+
Take into account the results of a Life in UK Rivers investigation into the hydrological requirements of Desmoulin’s whorl snail and identify areas for potential habitat enhancement.			2003+
In the upper Avon, enhancement of Desmoulin’s whorl snail habitat must take into account seasonal variations in flow and ensure that flow levels for in-river interests are maintained at all times.			2003+

6.2.1 Stakeholder Consultation

In order to produce effective WLMPs, the river and associated floodplain have been divided up into 30 hydrological units. Implementation of the WLMPs will involve meetings between the Environment Agency, English Nature and stakeholders within each hydrological unit. This will be the first time these interest groups have been formally brought together across the cSAC/SPA/SSSIs to decide how to integrate management for agriculture, flood defence and conservation. If the meetings are successful, it could be a useful structure for addressing future management issues in the river and valley should the need arise. The action required is detailed in Section 10.1.

6.3 Flood Alleviation and the Catchment Context

Past flood alleviation and land-drainage works have included dredging, widening and straightening river channels, which have had an impact on the habitat of the cSAC and the SPA. In some locations this has

led to the river being isolated from its floodplain and the loss of channel substrate and habitat features of ecological value.

New flood-alleviation schemes are required to protect Downton, Ringwood, Fordingbridge and parts of Salisbury. The Environment Agency is currently investigating options for schemes as detailed in Appendix F. In the case of new schemes, the Environment Agency will seek integrated solutions to reducing flood risk, including floodplain and water-level management where appropriate (Environment Agency 2000). Wherever possible, flood-defence options that deliver net wildlife gain in the catchment should be explored.

In the future, Catchment Flood Management Plans (CFMPs) will provide the context for flood management, and have the potential to benefit biodiversity as well as deliver flood protection. CFMPs will consider the adequacy of existing infrastructure and options for managing flood flows on a catchment basis. It is essential that the Avon CFMP takes into consideration the water level and flow requirements of the River Avon cSAC and SPA and opportunities for enhancement (including SAC, SPA and BAP species).

Action required	Delivery		
	By whom	Mechanism	Date
Flood-defence schemes should provide integrated solutions to reducing flood risk, delivering net wildlife gain.	EA, LA	Flood defence schemes	2003+
The Catchment Flood Management Plan must take into account the ecological requirements of the River Avon cSAC and the Avon Valley SPA and opportunities for wildlife enhancement.	EA, EN	CFMP	?

6.4 Development

The Environment Agency, English Nature and local planning authorities must work in partnership to ensure that development plans for the catchment contain suitable policies to protect and enhance the cSAC and its floodplain. CFMPs should inform and influence future development plans with respect to the location of new developments. The following aspects of development are of relevance:

- New developments at risk of flooding or aggravating flood risk elsewhere.
- Development on the floodplain where this would obstruct flows and reduce floodplain storage and wildlife habitat value.
- The use of Sustainable Drainage Systems should be promoted in order to minimise the impact of any new urban, road or industrial developments on receiving watercourses.

For details of issue and actions related to development refer to Section 8.