

Technical summary

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Ranunculus in Chalk Rivers

R&D Technical Summary W1-042/TS

Background

During the 1990s, following a series of low flow years, serious concern was expressed that *Ranunculus* (water crowfoot) in Chalk rivers had suffered a severe decline. In response to this many individual initiatives were launched to establish its status, and that of its associated aquatic plant community.

The Environment Agency is the lead organisation responsible for delivering obligations under the UK Chalk Stream Biodiversity Action Plan (BAP). A significant part of that obligation is the maintenance of the characteristic macrophyte community dominated by *Ranunculus*. Under the Habitats and Species Directive some Chalk rivers have been selected as Special Areas of Conservation (SACs), a component interest of which includes the *Ranunculus* community. To fulfil its responsibilities the Agency needs to understand what governs the success and failure of *Ranunculus* in Chalk rivers.

Many Chalk rivers are renowned fisheries where for centuries *Ranunculus* has been managed to provide the most favourable conditions for angling as well as control water levels and reduce flood risks. Thus the future wellbeing of the community is inextricably linked with, and often dependent on, other interests associated with the management of Chalk rivers.

The prime objective of the project was to draw together, and review, any information relating to the current state of knowledge on what affects *Ranunculus* growth in Chalk rivers.

Technical

The project was undertaken in two phases. Phase 1 involved the gathering together of data – literature, anecdotal observations and the views of people with a long association of working on Chalk rivers. Phase 2 required a detailed appraisal of, and reporting on, the gathered data, including a review of available relevant published papers and reports.

When attempting to identify 'cause and effect' of various environmental and anthropomorphic effects on the growth and distribution of *Ranunculus* in Chalk rivers, the review separated influences into **Factors** and **Drivers**. Factors are primarily measurable variables affecting *Ranunculus* growth and Drivers are anthropogenic and natural influences that change the character of the Factors.

Factors

- Discharge - Seasonal /Annual Changes
- Velocity, Depth, Levels
- Substrate & Siltation
- Physical Channel Characteristics
- Competition - Interactions, Life Cycles, Colonization
- Water Quality, Enrichment, Suspended Solids
- Grazing Light, Shade, Temperature

Drivers

- Natural Climate Cycles
- Abstraction
- Catchment water use
- Channel/Vegetation Management
- Enrichment from Point Sources
- Shading by algae
- Land use & diffuse enrichment
- Rehabilitation, augmentation etc.

By linking Factors to Drivers, the R&D aimed to identify ways in which the Environment Agency, and others, could be guided in their approaches to management of Chalk rivers for the benefit of the *Ranunculus* community.

The review also made an assessment of the status of *Ranunculus* in Chalk rivers through the decade of the 1990s.



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Outcome

The **factor** 'Velocity' was shown to be of prime importance to the growth and distribution of *Ranunculus*. 'Discharge' and 'Substrate/Siltation' were shown to be important too, with 'Light, Shade and Temperature' also reported as being significant. Despite local concerns, there were few references to damage from 'Grazing (by swans etc.)' or improvements due to changing 'Physical Channel Dimensions' (i.e. river rehabilitation). The factors 'Discharge' and 'Velocity' (including Seasonal Annual Changes) appear to operate in tandem. With sufficient discharge, velocity is instrumental in stimulating healthy growth, clearing away dying plant material, silt and potential competitors at the end of the growing season, and cleaning the substrate ready for regeneration and colonisation the following year.

'Natural Climate Cycles', relating to all aspects influenced by discharge, was highlighted as the most important **driver** influencing *Ranunculus*. Other drivers that influencing velocity, and therefore the suitability of habitats and conditions for *Ranunculus* growth, include channel and vegetation management, abstraction and the physical dimensions of a channel that can be improved through rehabilitation. Elevated nutrient levels are frequently mentioned in documents as contributing to the general ecological deterioration of many Chalk rivers, but more documents report an inability to find strong correlations between *Ranunculus* growth and water quality parameters.

All contacts reported that the low flows of the late 1980s and early 1990s resulted in a reduction in *Ranunculus*; equally all reported particularly successful years between 1998-2000. This has been almost entirely attributed to improved winter discharge following the negative effects of low flows. The reporting of poor growth in low flow years in the early 1990s, and the especially good recovery in recent high flow years supports the conclusions drawn from the literature that climate is invariably the key driver.

Despite the considerable amount of field work undertaken on Chalk rivers in the last 30 years there are many aspects of *Ranunculus*, and the Factors and Drivers affecting its growth and distribution, which remain undetermined or only partially answered.

On the basis of the conclusions drawn from the data review a number of recommendations for further works have been made. These have been listed into four categories:

- Research and Development (e.g. determining more objectively the effects of silt on growth, or biological interactions with algae as affected by changes in management practices);
- Field Trials (e.g. of different management practices on the community and other responsibilities);
- Monitoring & Survey (e.g. showing effects of rehabilitation and determining *Ranunculus* status in Chalk rivers where presently little is known at all); and
- Dissemination / Advisory / Promotion of Good Practice (e.g. leaflets making available previously disparate information - a summary leaflet has already been produced).

Thirteen discrete elements have been proposed, but as yet have not been set. A 'Forum' meeting held in November 2001 helped to set priorities.

Impact on the Environment Agency

The findings have important implications for improving the management and licensing responsibilities of the Agency by adopting best practices highlighted by the research. Since the project was a review of information, more work is required in converting the products into suitable formats to encourage the adoption of best practices. This is important since landowners and the Agency have clear responsibilities for *Ranunculus* communities of Chalk rivers under legislation relating to relevant BAPs and SACs.

This R&D Technical Summary relates to information from R&D Project W1-042 reported in detail in the following output:-

R&D Technical Report W1-042/TR
"Ranunculus in Chalk Rivers – Phase 2"
(includes W1-042/CD, a CD-ROM containing the reviews of over 350 reference sources)
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