



## RIVER SEVERN Regulation - fact sheet 3



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# Management of River Severn Regulation

**Regulation of the River Severn balances the needs of water users with the protection of the environment. This balance is managed by the Environment Agency in liaison with water users, to ensure that the river and the estuary are protected from damage resulting from low flows.**

### Controlling the flow

The Act of Parliament which allowed the creation of Llyn Clywedog also set down a minimum flow to be maintained at a control point at Bewdley in the middle reaches of the River Severn. The minimum flow was originally defined as 720 million litres a day (Ml/d) to ensure dilution of waste water discharges from the Black Country and to allow for abstractions and environmental needs downstream. This has now been changed to a five day average minimum flow of 850 Ml/d and a daily minimum flow of 650 Ml/d. This is to ensure that flows in the lower reaches of the river are held at a reasonable level while allowing for occasional, unavoidable daily reductions in flow.

There are several stages in regulating the River Severn. Firstly, flows at Bewdley and several other strategic sites are monitored daily to check how flows in the River Severn are changing. The flows are monitored remotely using telephone links to measurement sites on the river. These gauging stations provide information about flows at the site. In dry weather, a pattern of decreasing flows will become apparent.

As the average flow at Bewdley approaches 850 Ml/d, a River Severn Regulation Alert is issued. This is a letter to water companies, British Waterways and other interested

parties warning them to prepare for any restrictions that may be placed on them during regulation. The letter states that regulation releases may be required from Llyn Clywedog in the next fortnight.

### Supporting the river

Increased flow monitoring takes place during a Regulation Alert. Actual and proposed water use information from the water companies and other major users, such as Ironbridge Power Station, is analysed. This data is used to forecast when flows are likely to fall below the 850 Ml/d minimum flow at Bewdley. The forecasts are based on current trends, historic flow patterns, predicted abstractions and weather forecasts. When it appears likely that the minimum flow will be reached, releases are planned from Llyn Clywedog to support the flow.

The timing of the release is based on knowledge of current flow rates and the fact that water from Clywedog can take around four days to reach the control point at Bewdley. For this reason, planning of releases and co-ordination of abstractions is essential.

Maintaining the minimum flow at Bewdley is difficult. There are many factors that cannot be controlled such as the weather, or unplanned pumping from the river. For example, farmers using river water to irrigate their crops may take more water on some days than others meaning that flow predictions are not always accurate.

The amount of water released from the reservoirs is based on water users' requirements and how low flows are expected to fall. A balance needs to be reached at around 850Ml/d.

The maximum release that can be made from Llyn Clywedog for river regulation purposes is 500Ml/d. In addition, regulation releases can be made from Lake Vyrnwy. The main purpose of Lake Vyrnwy is to provide public water supply, so the contribution made to River Severn Regulation is limited, with only around 10% of the total storage at Lake Vyrnwy allocated for river regulation.

The travel time of a release of water from Lake Vyrnwy to the control point at Bewdley is about two days so it is shorter than that from Llyn Clywedog. This means that water from Lake Vyrnwy can be used if a short term flow adjustment is required. The water can also be used to support the river in the event of maintenance work taking place at Llyn Clywedog, which limits the ability to make releases.



The gauging station at Bewdley where flows on the River Severn are monitored



## Planning for success

A series of control points are defined on a graph of reservoir level through the year to assist in the management of Llyn Clywedog. These show whether the remaining reservoir capacity is sufficient to support the river should dry weather continue. If not enough water remains, the Shropshire Groundwater Scheme can be used. This groundwater is used in a very similar way to the water from the surface reservoirs. The amount of water required is determined by assessing rates of water use, flow patterns and other releases. Water will then be pumped from the boreholes and put into the river to support flows. Further information about the Shropshire Groundwater Scheme is available on the 'Introduction to the Shropshire Groundwater Scheme' factsheet in this series.

Whilst the timing and quantity of reservoir releases is important for successful management of the River Severn, close liaison between the Environment Agency and the major water users is essential. If it is unlikely that releases of water alone will maintain the minimum flow at Bewdley, Severn Trent Water and the South Staffordshire Water Company will assist by modifying their abstraction patterns from the River Severn. South Staffordshire Water have a small reservoir next to the river at Hampton Loade. Water for supply can be taken from there if the river abstraction is restricted.

The management of River Severn Regulation requires careful monitoring of relevant data and close liaison between the Environment Agency and water companies to ensure that the environment does not suffer as a result of demands for water supply.



At the end of the regulation season, the bare ground around the edges of the reservoir shows how much water has been used during the year

## Fact box 3

**Abstraction:** - This is the term for water being pumped directly from a river or via a borehole drilled into groundwater.

**Reservoir:** - These are formed when either a dam is built across a river or the flow is diverted into a storage area. They are a means by which water can be stored for future use.

**Groundwater:** - This is water that is found below the ground in cracks and spaces in the rocks and soils. It can be seen as a naturally occurring, underground reservoir.



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## RIVER SEVERN Regulation - fact sheet 1



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# Background to River Severn Regulation

The River Severn is the longest river in Britain. Its source is on Plynlimon in the Welsh Mountains and it flows 354km through Powys, Shropshire, Worcestershire and Gloucestershire before joining the sea at the Severn Estuary, which feeds into the Bristol Channel. Along the river's course, activities can occur which may change its natural flow patterns. For example, people take water from the river for their own use or dispose of treated waste water into the river. The river is managed to ensure that these needs are met without compromising the river's ability to support the natural environment. One way of managing flows is known as river regulation, which is carried out by the Environment Agency. Regulation involves supporting flows in the river with water from reservoirs and groundwater.

### River water - a valuable resource

The river flows through a highly varied landscape from the Welsh hills through lowland floodplains towards the estuary. Along the river's course there are many demands for its water.



This map shows the course of the River Severn

Most organisations or individuals wishing to use water from a river need an abstraction licence from the Environment Agency. These licences allow the holder to take up to a set amount of water to use for a defined purpose. For example, this could be for public water supply, irrigation of crops, or use in industry.



The river provides an important recreational amenity

### How much is too much?

Many abstraction licences today have restricting conditions on them. For example, a licence holder might have to stop taking water when the flow in the river falls below a defined amount. This helps to protect rivers when flows are naturally low. If everyone who was allowed to take water continued to do so when flows in the river were low, there would be a risk that the river would dry up completely. This could lead to environmental damage such as fish kills and the destruction of habitats, as well as a loss of amenity value. Placing restrictions on licence holders helps to manage the demand on the river.

In the 1950s it was realised that predicted demands for water from the river, particularly for public water supply, would be greater than the river could support, especially in dry years.

Ways to increase the reliability of river flow were looked at and the results of a survey published in 1960 led to new legislation being passed. This allowed a reservoir near the top of the Severn on the River Clywedog to be built.

This reservoir, Llyn Clywedog, has the primary purpose of storing water to support flows in the River Severn when needed.

Further water is available from Lake Vyrnwy on the River Vyrnwy. Water released from the reservoirs is then available for abstraction further down the river without the flows falling too low. Further information about Llyn Clywedog and Lake Vyrnwy can be found on the 'Llyn Clywedog and Lake Vyrnwy' factsheet in this series. When flows fall particularly low, additional water is available to support the river from the Shropshire Groundwater Scheme. This is a series of boreholes from which groundwater can be





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pumped into the river. Further information about the Shropshire Groundwater Scheme can be found on the 'Introduction to the Shropshire Groundwater Scheme' factsheet.



The river provides important wildlife habitats

### Other river users

The River Severn is used widely for recreation. Many anglers, ramblers, canoeists and other boat users regularly use the river and its banks. For these river users it is important that the amenity value of the river is preserved. The Environment Agency does this by supporting flows in dry weather and restricting abstractions.

Long periods of reduced flows can have a bad effect on river wildlife. Habitats can be damaged or destroyed. One of the reasons for regulation of the River Severn is to

protect these habitats by keeping river flows above an acceptable level.

The river is also managed to ensure that the tides in the Severn Estuary do not cause damage when flows are low. The estuary has the second highest tidal range in the world. The salty water brought upstream by the tides, and the effect that the tide can have on moving sediments in the river bed, can damage the environment and affect the water taken for public water supply. Any small negative effect in one area can have an influence further up or downstream or on a different species. River Severn Regulation helps preserve the natural balance of the river's ecosystem. Further information about the environmental benefits of this regulation can be found on the 'Regulation of the River Severn and how it benefits the environment' factsheet in this series.

River Severn Regulation usually occurs during the dry, summer months. In wetter weather when flows are high, there is the potential for flooding on the River Severn and its tributaries. Further information about flooding can be obtained from the Environment Agency by calling our Floodline number on 0845 988 1188.

## Fact box 1

**Reservoirs:** - These are formed when either a dam is built across a river or the flow is diverted into a storage area. They are a means by which water can be stored for future use.

**Abstraction:** - This is the term for water being pumped directly from a river or via a borehole drilled into groundwater. There are laws governing the abstraction of water and most users need to be licensed by the Environment Agency.

**Groundwater:** - This is water that is found below the ground in cracks and spaces in the rocks and soil. Groundwater could be seen as a naturally occurring, underground reservoir.

**Amenity Value:** - Can include recreational facilities such as locations for water sports, walking and cycling in a pleasant environment.

**River flow:** - This is the movement of water draining from the land out to the sea in river channels. The flow is made up of rainfall draining in to the channel, baseflow, which is supported in many cases by groundwater and releases of waste water.

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