NORTH CENTRAL
Catchment Management Authority
Connecting Rivers, Landscapes, People

What is an Environmental Flow?

An environmental flow, or e-flow for short, is any managed change in a river's flow pattern intended to maintain or improve river health.

Environmental Flow activities

The North Central Catchment Management Authority (CMA) updates regular e-flows activities.

What is the White Paper?

The White Paper - Securing Our Water Future Together - is a Victorian Government initiative. It is one of the most innovative, highly integrated water strategies in Australia. It aims to improve water management to secure water for future use, so we can continue to enjoy the benefits it brings. The White Paper sets out an action plan to secure Victoria's water future over the next 50 years.

What is an Environmental Water Reserve (EWR)?

Through the White Paper, Victoria has created an Environmental Water Reserve (EWR) to secure the long-term health of waterways and the future of irrigation, tourism and recreation industries. For the first time, rivers and aquifers will have 'rights' to an allocated share of Victoria's water. In regulated systems it is possible for the EWR to include a bulk entitlement allocated specifically for environmental purposes. Other actions identified in the White Paper to enhance the EWR in regulated rivers include:

- Water savings
- Water recycling and re-use
- Delivery infrastructure upgrades
- Water donations
- Water purchasing, amongst others

What is the North Central Catchment Management Authority's role?

Priority areas for enhancement of the EWR in regulated and unregulated rivers, potential large scale land-use changes in the catchments, water quality issues, outlook for regional development, Regional River Health Strategies. Managing the EWR includes:

- Negotiating the most effective release pattern for the EWR in surface water, ie: managing environmental flows
- Negotiating the most effective groundwater extraction regime
- Developing operating strategies
- Monitoring and reporting on environmental condition
- Engaging the community regarding environmental flow issues
- Undertaking complimentary habitat, floodplain and water quality improvements

Why are they necessary?

Flow regulation and over extraction have been the most important factors in the decline in river health and loss of biodiversity in the Murray-Darling Basin. Many of the rivers and creeks in the North Central region are "flow-stressed" because too much water is taken out for other users and natural flows have changed so dramatically. For example, in 2003/2004 the Loddon River retained only 7% of its total volume of water within the river. The remainder was extracted for consumptive use. Many rivers are literally "running dry" and not only because of the drought!

The major changes in flow caused by regulation are:

- Reduced variability (to produce a reliable water supply), ie: a reduction in high flows and at the other spectrum, cease to flows
- Change in seasonality
- Fewer low water periods
- Reduced frequency of small floods that reconnect and inundate floodplain habitats and wetlands

Because of these changes, many of the natural cues that trigger life cycle events no longer occur. These include:

- High flows that trigger native fish such as Murray Cod and Golden Perch to migrate and spawn
- Overbank flows to inundate areas of River Red Gums and allow regeneration

There is a need for a balance between how much water we take out for industry, agriculture and domestic use and that which we leave in the river system to maintain the environment. A very high proportion of rivers across Victoria are highly 'flow stressed'. We now have an improved understanding of the environmental water requirements of our rivers, the benefits of environmental flows and better techniques and tools for assessing these needs.

Do Environmental Flows Work?

It is impossible to restore flows across the state to pre-regulation conditions. Rather, the aim of environmental flow management is to mimic natural flow regimes, providing cues for key life cycle events such as spawning and migration. They can also rehabilitate and improve ecosystems. Environmental flows are only one part of a healthy river and the maximum environmental benefits can only be realised with complementary river restoration works such as fencing, erosion control, pest control and revegetation.

What are the Benefits of Environmental Flows?

The benefits of environmental flows include social, economic as well as environmental. Environmental flows are often perceived by some people as a waste of water. On the contrary, environmental flows ensure the long term prosperity of the communities and farms which rely upon a healthy river.
Some of the benefits environmental flows produce, include:

Community:

- Improves water quality for stock and domestic needs and for downstream irrigators and other users
- Provides an attractive and enjoyable destination for tourists, families and industries
- Increases investment opportunity in environmentally-based tourism
- Attracts recreational fishers
- Allows increased productivity of farming lands in association with wetlands particularly on northern and western floodplains

Environment:

- Supports breeding of insect-eating waterbirds such as ibis
- Prevent regular stagnation of water
- Moves carbon (the product of decomposition of material buried or lying on the floodplain) between the river floodplain and wetlands, which science indicates is a key factor in maintaining healthy rivers
- Improves river bank vegetation health, which stabilises banks and slows erosion
- Stimulates native fish such as cod, yellow belly and catfish to move onto the floodplain to feed and breed.
- Provides flows of sufficient depths and duration for waterbirds, such as ibis, cormorants and night herons, to build nests, breed and raise chicks to fledging age
- Replenishes aquifers and dilutes salty water left in wetlands and billabongs following evaporation
- Stimulates invertebrate eggs to hatch and plant seeds to germinate

What type of flows are Environmental Flows?

The flow regime of a waterway can be broken down into simplified flow components. Environmental flows aim to mimic all the natural flow components of a flow regime. A natural flow regime can consists of the following flow components, described by timing, seasonality, frequency and duration:

a. Cease to flow: The cease to flow is the period of no discernible flow in a river. This may lead to either total or partial drying of the river channel. Cessation of flow is a common occurrence in many Australian rivers. The cease to flow period is a period of stress for the ecosystem and the extension of this period can have harmful effects.

b. Low flow: low flows provide a continuous flow through the channel. The flow may be limited to a narrow area of the channel but will provide flow connectivity between habitats in the channel. Low flow is an important flow component because it acts as a refuge from high flows. Low flows have been suggested as being very important for native fish recruitment and other functions.

c. Freshes: A fresh is the term used to denote small and short duration peak flow events. These are flows that exceed the base flow and last for several days, often as a result of intensive and sometimes localised rainfall. Freshes are important in improving water quality, allowing the input of freshwater and mixing pools.

d. High flows (in channel): The key characteristic that distinguishes a high flow from a fresh is the persistent increase in the seasonal base flow that remains in the channel. High flows effectively wet and connect most habitats within the main channel and are important for fish migration through the system. High flows can also act as a trigger or requirement for breeding in some fish species.

e. Bankfull flows: These flows are of sufficient magnitude to reach bankfull condition with little flow spilling onto the floodplain. Bankfull flows are an important trigger for fish breeding and while they may only last for several hours and up to a maximum of a day or so, high flows may last for considerable periods afterwards which enables fish recruitment.

f. Overbank flows: These flows are greater than bankfull and result in the inundation of the adjacent floodplain habitats. Inundation of the floodplain is ecologically important, providing significant carbon returns to the river, floodplain productivity, vegetation community maintenance, waterbird habitat and breeding grounds, fish community diversity, invertebrate colonisation and linkages with the stream channel, wetlands and lakes.

What has been achieved so far?

Some of the key achievements for environmental flow in the North Central Catchment have been:

- The flooding of 3 wetland complexes within Gunbower Forest over 2 successive years resulting in improved health of dependant flora such as River Red Gums, sedges and rushes, and the breeding fauna such as spoonbills, herons and egrets
- The Loddon River - Environmental Reserve Bulk Entitlement which provides the Loddon River with a defined share of water for the River and associated wetlands
- The amendment to the Campaspe Bulk Entitlement to provide environmental flows during times of stress

Regulated Rivers

A river or stream where the flow is controlled or modified from its natural conditions (mostly by a major dam)

Flow regulation typically produces a more consistent and reliable flow pattern; one which is better suited to exotic plants and animals, such as carp. Native plants and animals prefer the natural flow pattern to which they have adapted

In the North Central region, the Coliban, Campaspe and Loddon Rivers are all regulated by large dams and reservoirs.

Unregulated Rivers

- Don't have their flow managed via large dams or weirs
- Unable to store water for drier months when the demand is high - dependent on the climate

- Major change to flow is extraction or diversion for irrigation, domestic and stock water, which lowers the streamflow
- Many unregulated rivers are stressed because too much water is diverted, changing the natural flow pattern.
- An "environmental flow" is any managed change in a river's flow pattern intended to maintain or improve river health
- The flows aim to mimic the natural flow pattern - the flow pattern required to keep our rivers healthy
- An "environmental flow" is any managed change in a river's flow pattern intended to maintain or improve river health
- Environmental flows can help restore, rehabilitate and improve the health of our rivers
- Environmental flows aim to mimic the natural flow regime and provide cues for key life cycle events
- Environmental flows ensure the long term prosperity of communities and farms that rely upon a healthy river
- Good management of the available water for the environment and complementary river restoration works will ensure the best ecological results
- As a community we need to balance how much water is used for industry, domestic use and agriculture, and that retained in the river system to maintain the environment
- Environmental flows are not just used in large river systems such as the Murray. Other systems such as the Avoca, Avon-Richardson, Loddon, Campaspe their tributaries and floodplains will also reap the benefits of environmental flows