



AQUATIC ANIMALS HEALTHY CREATURES...

Healthy creek ecosystems provide habitat for native fish, freshwater turtles, platypus and many other aquatic organisms.

The health of these creek ecosystems downstream from the dam is maintained by ensuring good water quality, environmental flows and riparian vegetation (See *Info Sheets 6: Rainforest Regeneration; 11: Riparian Vegetation; and 10: Environmental Flows*)

Barriers to Movement

Many species of fish need to migrate to the upper reaches of creek systems in order to breed. Large barriers, such as Emigrant Creek Dam, prevent them from doing so. It should be noted, however, that the natural barrier of Killen Falls which is 15 metres high also has this effect. This means that it is unlikely that the dam is restricting the upstream migration of these fish species.



Protected Species

During the driest times, the depth of water over very shallow places in the creek (called 'riffle zones'), small waterfalls and other in-stream barriers is reduced. Rous County Council's studies show that large aquatic species that need to move between pools in the creek find it difficult during these times and are most vulnerable to periods of low flow. These are the Platypus, Freshwater Herring, Australian Bass, and Eastern Freshwater Cod.

The environmental flows that Rous County Council is now ensuring for Emigrant Creek protects three of these species, many other aquatic organisms, and the water quality downstream, whilst maintaining a viable water supply.

At the present time, minimum flow levels are maintained greater than 5 megalitre/day in winter, and greater than 7.5 megalitres/day in summer. That's the equivalent of 2.5 Olympicsized swimming pools a day in winter and nearly 4 pools a day in summer! (See *Info Sheet 10: Environmental Flows* for more detail.)

The Platypus

(*Ornithorhynchus anatis*) is a creature loved by us all. It is a monotreme (a type of mammal that lays eggs) and is amphibious (lives in burrows in the banks of the creek and swims in the water with its webbed feet). It feeds on aquatic invertebrates with its highly sensitive duck-shaped bill. It spends about half its time feeding and the other half in its burrow. During the breeding season, females live in long, complex burrows where they lay their eggs and then nourish their young with milk for around 3 to 4 months. Sufficient flows in the creek are particularly important for the platypuses when they are rearing their young and they first emerge from their nesting burrows. Flows are also important for the young platypuses throughout the winter for maximizing their foraging area and providing good habitat for their invertebrate food.



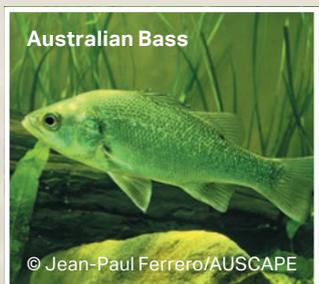
The Freshwater Herring

(*Potamalosa richmondia*) is a fast-swimming fish that forms schools and commonly grows to about 15cm long. It migrates downstream to the estuary in winter, presumably for spawning (laying and fertilizing its eggs). It is a food source for the Eastern Freshwater Cod. It eats worms, small crustaceans and insects. It is not common, but its status seems secure. Baseflow protection ensures sufficient water in the creek for the migration upstream of the young fish, while medium flows ensure sufficient flow for the adults to migrate downstream to breed in the estuary.



The Australian Bass

(*Macquaria novemaculeata*) grows to about 60cm and 3.8 kg. It likes the cover of aquatic vegetation in rocky pools. Only females live upstream, while males tend to stay in the lower, estuarine parts of rivers. Flood events in the winter months trigger migration of the females downstream to spawn in the estuaries. Young fish feed on plankton, while adults eat insects, crustacean and smaller fish. They are a very popular species for fishing and are good to eat. Its numbers have declined, although it is not yet listed as a threatened species, because of the increase in





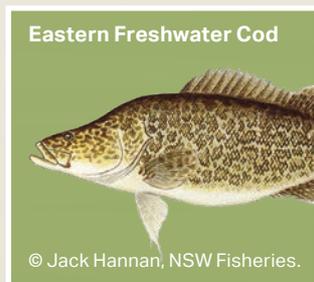
the number of dams in its area of distribution. Dams can block access to its upstream habitats and stop the cues to spawning provided by flooding. The environmental flows established at Emigrant Creek Dam, however, ensure that this species is protected. In the same way as the Freshwater Herring, low flows ensure migration upstream of the young and medium flows ensure adult migration downstream and trigger the breeding response.

It's all about sharing water...

When designing the environmental flow regime, it was not possible to completely protect the Eastern Freshwater Cod whilst ensuring the levels of water need by humans. According to the Rous County Council studies, the 'low flow' rates decided upon are not sufficient to provide enough water depth above riffle zones and other in-stream barriers to allow fish passage for the Cod. With the intention of compensation for this valuing of human needs above the needs of a species of fish, Rous County Council is contributing to critical research programs, as well as educational material that are a part of the Eastern Freshwater Cod Recovery Plan process. (It should also be noted that the decision to set environmental flows that were not sufficient to protect the cod were partially based on the lack of 'hard evidence' of the existence of the species in the Emigrant Creek system.)

The Eastern Freshwater Cod (*Maccullochella ikei*) is

a large fish which can grow up to 66cm and 41kg! Its preferred habitat is the pristine sections of clear, flowing rocky streams scattered with logs and other woody matter. It is listed as an endangered species under both NSW and Commonwealth law. These fish



Eastern Freshwater Cod

© Jack Hannan, NSW Fisheries.

used to be common in the Richmond and Clarence Rivers, but over the last 30 years have become rare, and only occur in the upper Clarence. It is thought that their decline has been caused by a combination of overfishing, too much water being taken out of river systems (eg, for town water supply and agriculture); pollution (such as toxins, heavy metals, fertilizers, animal wastes, acid run-offs); habitat degradation (including reduction in rocks and snags, undercut banks and aquatic vegetation); barriers to waterways such as dams and weirs; and competition with introduced species. An artificial breeding and stocking program began in 1989 and research programs have found eastern cod up to 60cm in Rocky Creek Dam. There have been anecdotal reports of the cod in Emigrant Creek Dam and downstream. Despite a number of intensive surveys, however, no actual evidence of cod has ever been recorded. It is concluded that, if cod are present, their numbers must be very low. A recovery plan has been developed for the eastern cod under the Fisheries Management Act (1994). It is not yet clear whether self-sustaining populations of the fish in the Richmond River System have been established by the recovery program.

Healthy Ecosystems = Good Water Quality

Water quality in Australia's rivers and water storages has been declining for the last 100 years and maintaining its quality can pose significant cost. This decline is linked to the loss of biodiversity in aquatic systems. This is because in nature there are a wide range of processes that sustain water quality. For example, plants in some creek and wetland systems can act as natural filters, whilst some aquatic animals can help control algal blooms. Healthy, functioning ecosystems maintain our water quality.

TRY THIS!

Learn with your...



"What is more important: having a big enough water supply for all our human uses, compared to having healthy ecosystems downstream from the dam? (Hint: This is a trick question. They are both important. The question really should be how do we share water between all the different needs for it – human and non-human.)"



"What are your favourite animals that live in the creeks around here? How would you feel if they became rare, endangered, or even extinct? What can you do to make sure that doesn't happen? What is Rous County Council doing to ensure that this doesn't happen"



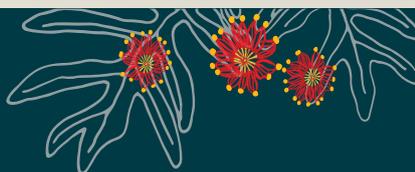
"Look down at the creek as carefully as you can. What sort of vegetation can you see on its edges? Can you see any animals in and around the creek from this distance? See if you can imagine what the ecosystem is like under the surface of the water? What plants and animals would you find there?"

Learning objective: *To understand how supporting healthy ecosystems protects particular species of animals; the importance of environmental flows for ensuring ecosystem health; Rous County Council's responsibility and role in ensuring environmental flows.*

(Sources: 'Freshwater Fishes of Australia' by GR Allen, SH Midgley & M Allen (2002), Western Australian Museum; Report to Council re Environmental Flows for Emigrant Creek (May 2001) supplied by Rous County Council; 'Emigrant Creek Dam – Dam Strengthening Works, Review of Environmental Factors' prepared by The Environment Works (2000) for NSW DPWS on behalf of Rous County Council; 'The Biology and Management of the Platypus' by TR Grant (1991) published by NSW NPWS)

For further information contact:

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These information sheets were originally prepared for Rous County Council by Sustainable Futures Australia in liaison with Widgee elders. © Rous County Council and Sustainable Futures Australia 2007. This is an educational project for the protection of water land, and for reconciliation.

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