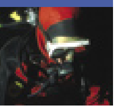


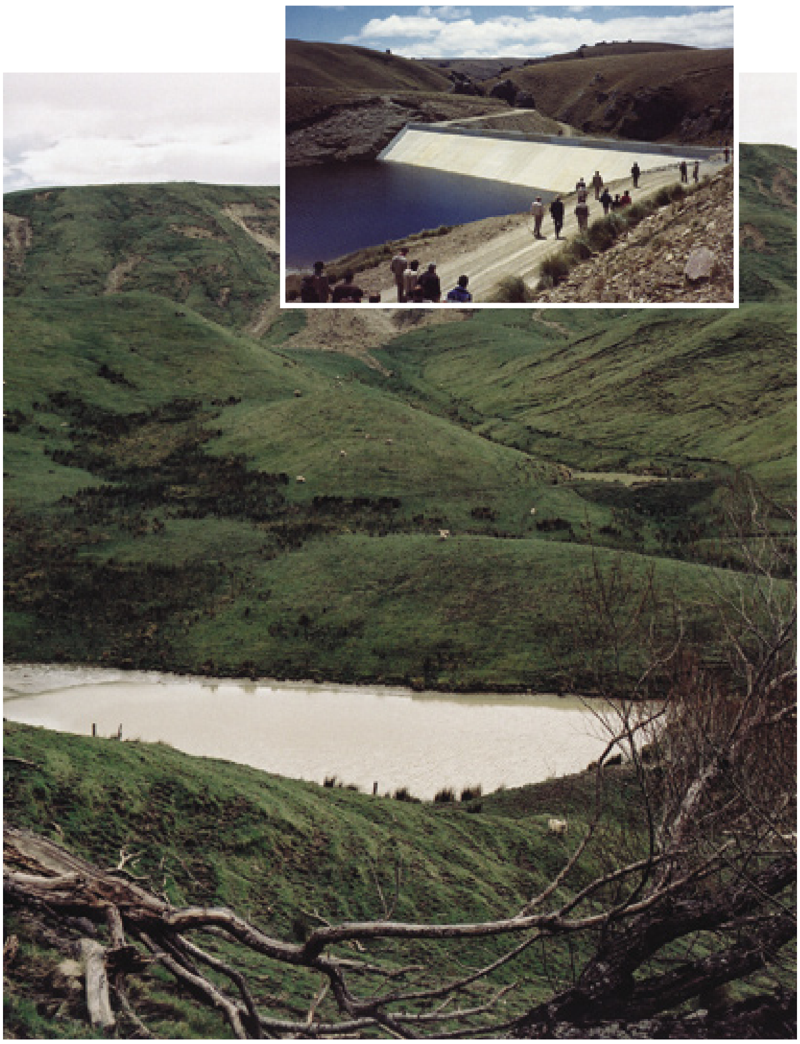
Freshwater

Does the river look good?

Water managers have to set the minimum amount of water which must flow down a river, so they know how much extra is available for irrigation and the like. Recommendations on minimum flows have traditionally relied on evaluating how much the insects and fish in the river need. However, what humans ‘like to see’ when looking at rivers is becoming increasingly important in deciding on residual flows.

NIWA ecologists have teamed up with social and landscape scientists from Lincoln University and Boffa Miskell Ltd to investigate this issue. We are identifying key physical factors of riverscapes which people, often unwittingly, sense, and which make a river seem appealing or unattractive to them.

The work will link the various possible states of these factors with value judgement scores and then ultimately to two-dimensional hydraulic and spatial simulation models. This will enable water managers to see how different minimum flows affect what the river looks like, and assess people’s likely response to the rules they set.



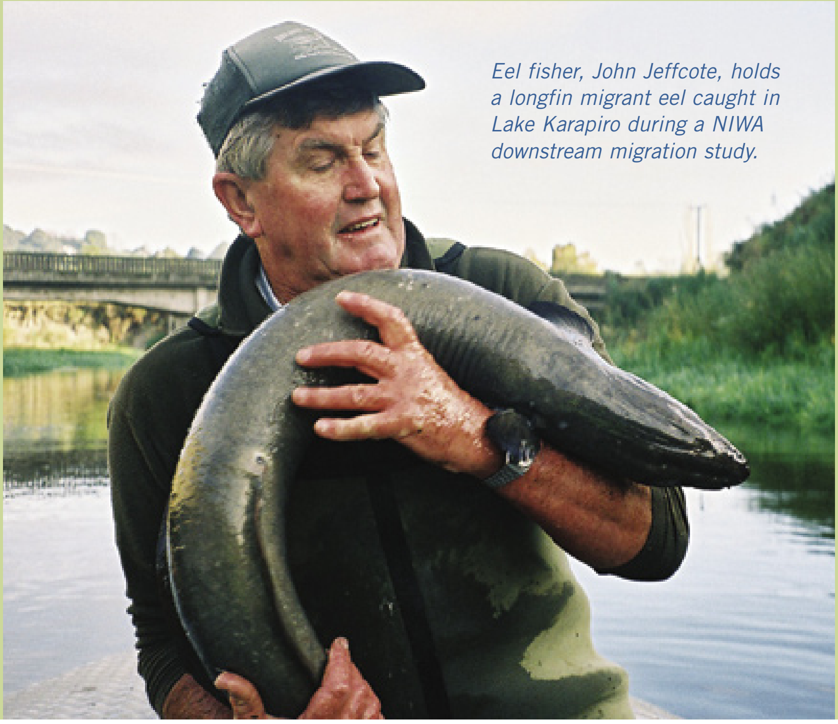
What small dams really do to water availability

Small farm dams are a rapidly increasing feature of rural landscapes. They’re a handy way to collect and store water for irrigation, stock, and even domestic use. People also build them to create lakes as ornamental features, wildlife habitats, and recreational facilities.

The dams may be small, but do they stop the periodic high flows that help maintain the stream environment? Floods naturally clean out stream channels, flushing sediment from banks and pools, and keeping vegetation at bay.

We know of over 2000 small dams, though information is patchy, not least because some regions do not require resource consents for such structures. We developed an index to assess how much effect a dam could have, then we mapped this index, overlaying the position of known dams, using the River Environment Classification system.

Our analysis showed that in many areas small dams could intercept more than a quarter of the annual runoff. This could severely deplete low flows, change the movement of sediment, and significantly alter habitats for animals and plants living in the stream.

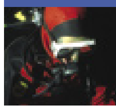


Eel fisher, John Jeffcote, holds a longfin migrant eel caught in Lake Karapiro during a NIWA downstream migration study.

How to get eels safely past hydro-dams

These days we have good methods for ensuring the safe upstream passage of young eels past hydro-dams. There are also safe ways for adult eels to get back out to sea, but ensuring the eels do not enter turbine intakes is proving a challenge.

Meridian Energy and the Foundation for Research, Science & Technology are funding us to track adult eels migrating downstream from Lake Manapouri. To assist in the tracking, electronic transmitters are surgically implanted into migrating adult eels. The latest results indicate that a significant proportion of the migrants are able to find the lake outlet and successfully pass downriver, avoiding the power station. We are now focusing on ways to deter the adult eels from entering the power station intakes, and how to encourage them to take the safer route.



Smart science improves flood forecasting

Flooding is not just a matter of how much and how fast the rain falls. It's also a question of how much a catchment can handle. Historically, flood forecasting has relied on gauges measuring the amount of water flowing down rivers.

In March 2003, NIWA installed a trial version of a new, advanced flood forecasting system for the Rangitaiki River in Environment Bay of Plenty's office at Whakatane. During the Bay of Plenty floods in July 2004, the system accurately forecast the size of the river's peak flow at Te Teko, 30 hours in advance. Our prediction was 790 cubic metres per second; the actual flood flow was about 750 m^3/s.

The Bay of Plenty trial is just one application of a New Zealand-wide flood forecasting system we have developed which derives river flows from numerical rainfall forecasts.

Our 'Topnet' model, which we use for the flood forecasting system, has many other uses across the country. It can also be used for actively managing the amount of water allocated to different needs, such as irrigation, water supply, hydropower, and the in-stream environment. It can help forecast the spread of sediment or pollution, and it can be used for water resource assessment and planning.

The science behind this project was funded by the Foundation for Research, Science & Technology.