

## **Challenges with fish passage - A management perspective**

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### **ABSTRACT**

The development of instream structures, including the demand for freshwater infrastructure by urban, industrial and agricultural uses as well as changes in rainfall patterns due to the climate change are having increasing negative impact on the natural migrations of Australian freshwater fish. The Queensland Department of Primary Industries and Fisheries have been pursuing a fish passage program since mid 1990s to address this issue. This program includes putting in place some legislative requirements to make sure that all new instream structures which obstruct fish passage provide a means to assist fish passage over the structure. However, the challenges in providing fish passage over instream structures are numerous. This paper attempts to create a healthy discussion on issues related to the provision of fish passage and the availability of freshwater habitat to Australia's freshwater fish species.

### **INTRODUCTION**

Since the arrival of Europeans in Australia in 1788, the construction of barriers to extract water from freshwater streams has become common. The need to build more instream barriers has become more urgent as demand for freshwater has increased due to urban, agricultural and industrial needs. This in turn not only results in changes in the stream hydrology but also in the freshwater ecology and native fish populations and communities.

Many Australian native freshwater fish species migrate at some stage of their life cycle to access spawning, nursery and feeding grounds. Free movement is important for the survival of Australian native fish species. This migration could be both downstream into estuaries or upstream into the headland waters (Jackson, 1997). In inland waters fish migration is very important in terms of dispersal of the species during the rainy season after being trapped in drought refuge waterholes during the dry months. Hindrance to fish migration, through the construction of instream barriers, can and has severely depleted native fish populations (Cotterell 1998).

The importance of fish passage over instream structures was recognised relatively early in Queensland. About 22 fishways were constructed in the state by 1970 (Jackson 1997). In relation to the construction of fishways in early days, the main challenges were designing fishways suitable to the swimming ability of native fish species, with an apparent lack of knowledge on the biology and behaviour of Australian native fish species. Although current knowledge of native fish species biology, behaviour and fishway designs have improved significantly, the challenges in relation to the provision of fish passage over instream structures seems to have changed significantly.

### **PRESENT CHALLENGES FOR FISH PASSAGE**

Current challenges to fish passage could be divided into a wide range of categories, but we would like to bring the impacts of increased demand for freshwater due to

population growth to the readers' attention as probably one of the two most significant factors affecting fish passage. In general terms, the viability of a development associated with a freshwater supply is analysed based on future population growth and its input into the regional and state economy. The provision of freshwater should include the management of demand as well as trying to satisfy demand. As with most natural resources, the supply of potable water from freshwater wetlands is a finite resource. This is even more apparent now as future water supply is becoming increasingly uncertain due to climate change. Logically thinking, without the management of population growth, the demand to harvest water from freshwater wetlands will increase exponentially. This is so because water demand is not only limited to the number of individuals in a population, but also the additional need for water they create due to production of agricultural and other goods and services they require for their daily necessities such as food, transport and housing etc. That in turn puts pressure on the amount of water allocated to the environment in order to maintain reasonable flows that support the ecological processes and integrity of a catchment.

The second significant factor for fish passage is the impacts of climate change. Modelling studies based on future climate predictions have proposed various scenarios for future climatic conditions. All scenarios suggest a drastic change in rainfall patterns and water flows through our streams (CSIRO 2007a). Thus it is imperative that the future water planning process includes water availability modelling, based on the climate change rather than past flows and rainfall patterns (CSIRO, 2007b).

It has to be kept in mind that the construction of fishways and fish friendly structures such as culverts and causeways are not sufficient by themselves to assist in the migration of fish. Environmental flows are required to be sufficient in terms of flow rates, season and duration of flow to provide the necessary cues and to allow fish to complete its migration. Allocation of water based on desk top calculations may not be sufficient to provide adequate environmental flows for fish. In addition fish are required to migrate throughout the year, or at least should be able to migrate at crucial times of the year for reasons such as spawning, feeding and dispersal.

### **TAKE HOME MESSAGE**

This short article is not about highlighting all known factors affecting fish passage. It is neither about making a moral statement about how humans should or should not use freshwater. It is to create a healthy discussion amongst scientist, managers, and other interested parties on issues related to how population growth impacts on the demand for freshwater. We believe that the issues associated with population growth have not been openly discussed despite being one of the most important factors impacting on freshwater habitats, fish populations, other natural resources and the environment.

### **REFERENCES**

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#### CURRICULUM VITAE

Zafer Saraç has completed his Bachelor of Science and Master of Science degrees in Turkey specialising in Freshwater Fish biology. Later he studied in Japan for a year as research officer then completed another Master of Science Degree in Marine Chemistry. After migrating to Australia in 1989, he worked in aquaculture research for six years in Queensland. After working in marine habitat management for two years, he led a legislation group to amend the Queensland Fisheries Act 1994 and Integrated Planning Act 1997 to incorporate fisheries related development approval into the Integrated Development Assessment System under the Integrated Planning Act. Since 2005, Zafer has been leading the Freshwater Habitat Unit within the Queensland Department of Primary Industries and Fisheries which includes management of fish passage through the Queensland waterways.