

# FRESHWATER HABITAT PROTECTION— A MANAGER'S PERSPECTIVE

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## **Introduction**

Many of Australia's inland aquatic habitats are seriously degraded, some to the point where their long-term ecological sustainability must be in serious doubt (Hart 1992). From a fisheries viewpoint, habitat degradation has been implicated in the decline of many native species. The Freshwater Fish Action Plan (Wager and Jackson in press) lists habitat degradation along with negative interactions with introduced species as the major threatening processes for freshwater fishes (see also Jackson, Koehn and Wager this meeting). Fish under threat range from small species of high conservation value such as the honey blue-eye (*Pseudomugil mellis*) to important recreational species such as Murray cod (*Maccullochella peelii*).

This paper looks at the protection of fish habitat from a manager's perspective and uses the plight of the Mary River cod (*Maccullochella sp.*) to illustrate some of the points.

## **Managing inland waters**

Managing habitat for long-term sustainability of fisheries in inland waters is inevitably about managing competing uses of resources within a catchment (e.g. instream vs offstream use of water, land use for agriculture vs retention of catchment vegetation etc.). Protection of habitat cannot be achieved without consideration of land use practices within the catchment. In only very few circumstances, perhaps headwater

tributaries in forested areas or catchments contained wholly within National Parks, will there be no change in aquatic habitats. Multiple use of catchment resources will inevitably mean change.

Given the above, the data required by managers may be summarised as follows:

- *What are the most important areas of habitat to protect?*  
Baseline data must be available on existing habitats and their fish communities. Are there priority habitats to be protected? Are there particular tributaries within a catchment that are more important than others? This may be important if there are multiple choices for a proposed impoundment site for example.
- *What are the key characteristics of the habitat?*  
It is important to determine the habitat variables that are predictive of fish community structure. What are the habitat characteristics that a manager must try to protect?
- *What are the trends?*  
Is the habitat stable or is it degrading?
- *What are the acceptable levels of change in habitat variables?*  
What are the boundaries of acceptable change? For example, how much water can be harvested for offstream use and how much can the seasonality of flow regimes be altered without major impacts on fish communities.

- *What are the quantitative relationships between habitat change and catchment activity? What are the causal factors in habitat degradation and how can they be managed?*

It is important to establish the linkages between catchment activities and instream habitat. Inevitably quantitative relationships will have to be established. For example, what land use practices contribute to sediment runoff and how can land use practices (at the on-farm scale) be modified to reduce sediment contribution to an acceptable limit?

- *What are the habitat rehabilitation options?*  
In certain circumstances management actions to rehabilitate degraded habitat may be both desirable and practical. For example, replanting riparian vegetation may be an option or it may be feasible to rehabilitate the channel form to create appropriate habitat diversity (e.g. pools and riffles etc.) in streams with reduced water flows. A manager needs data on specific rehabilitation requirements.

### **The Mary River cod —a case study**

The Mary River cod (*Maccullochella sp.*) is an important recreational angling species that has greatly declined in both numbers and distribution since the early 1900s. It is thought to be identical to a fish that previously occurred in the Brisbane, Logan, Albert and Coomera Rivers in south-eastern Queensland. It is currently restricted to a few larger tributaries of the Mary River including Obi Obi, Six Mile, Tinana and Coondoo Creeks. It is generally found in deeper pools of these relatively undisturbed tributaries where fallen timber, branches and boulders provide cover.

The Mary River flows through a multiple land use catchment after rising in the Conondale Ranges north of Brisbane. The catchment area is about 9595 km<sup>2</sup> of which approximately 65% is freehold agricultural or grazing land. The

remainder is predominantly State forest with a significant amount of this being exotic pine. National Parks account for less than 1% of the total catchment area. There are water storage dams on three of the tributaries and further water harvesting is planned.

Although definite data are not available, threats to Mary River cod appear to include: dams and weirs as barriers to movement, loss of native riparian vegetation, extensive siltation from catchment erosion due to land use practices, stream channel damage due to land use practices, stream channel damage from sand and gravel extraction, possible competition with translocated species (golden perch, *Macquaria ambigua* and silver perch, *Bidyanus bidyanus*) and overfishing.

#### *Available data*

In 1991, habitat surveys of the Mary River were undertaken by staff from the Queensland Fisheries Division's Southern Fisheries Centre. These surveys have provided 'broad brush' information on the condition of instream habitat and disturbance types within the Mary River catchment. Additional habitat information and fish community structures in the Mary River have been obtained by Brad Pusey from the Centre for Catchment and Instream Research, Griffith University.

Data are available on land use within the catchment and some information is available on the status of riparian vegetation from aerial photographs obtained by the Queensland Forest Service.

Information on Mary River cod distribution and abundance remains largely anecdotal or is derived from catch records by local anglers.

#### *Data requirements*

Clearly there are gaps in available knowledge that must be filled if Mary River cod habitat is to be effectively managed to ensure the long-term conservation of the species.

Definitive data must be obtained on the present distribution of cod in the Mary River system together with more concise data on the habitat requirements of the fish. The Queensland Fisheries Division has received funding from the Australian National Parks and Wildlife Service to undertake the necessary fish surveys this year. The information obtained will also provide baseline data on cod distribution and abundance and, together with future surveys, will enable trends to be evaluated.

The links between instream habitat change and catchment activities must also be established. Ultimately management prescriptions will need to act at the individual farm level if they are to be effective in the Mary River catchment.

Finally there is a need to establish the acceptable levels of habitat change. Most pressing is the need to determine environmental flow requirements in the tributaries containing cod, e.g. Six Mile Creek and Obi Obi Creek already have impoundments on them and more water harvesting is planned.

### *Management options*

Effective protection and management of Mary River cod habitat cannot be achieved without a whole catchment approach. The Mary River catchment is to become a pilot catchment for the Queensland Department of Primary Industries' Integrated Catchment Management Initiative and a community driven catchment coordinating committee has already been established. Ultimately a catchment management plan will be produced and the protection of instream habitat will be part of that plan.

Data obtained on specific habitat requirements of Mary River cod and effects of catchment activities on cod habitat will enable effective management measures to be put in place. However, it is important to recognise that managers cannot always wait until definitive data are available and often must act on the best information to hand at the time.

In the case of the Mary River, options for future impoundment sites are being considered now and preliminary data on cod distribution must be used to ensure proper input to the initial planning process. Similarly, some management options can be implemented immediately. A good example is the protection of remaining native riparian vegetation and the implementation of measures to revegetate stream banks.

### **Conclusions**

Ultimately, managers require specific information on habitats, what are the key habitat variables and what are the limits of acceptable change. In many cases these data are not yet available but often general information is available on the broad threats to habitat (e.g. removal of riparian vegetation, increased sediment input, regulation of stream flows). Managers must use the best available data to mitigate these effects whilst encouraging and supporting habitat requirement research.

### **References**

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