

# Murray-Darling Native Fish Strategy – Audit of Water Quality Problems

## Final Report

**Project Number: R2113**

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## Introduction

This project aimed to bring together spatial data, managers and key issues to facilitate better management decision making, and to enable the creation of more value for money solutions from the funding that is being spent on strategic programs for the management and conservation of the native fish of the Murray-Darling Basin.

The philosophy driving this project and its methodology was the recognition that there is a vast array of previously collected data especially for the Murray-Darling Basin projects or in the area that the Basin covers. If this data was accessible through one integrated and interpreted spatial dataset for managers responsible for formulating strategic native fish conservation management plans and to catchment managers generally, then they would be able to utilise this data much more effectively. They would also gain an insight into the complexity of issues occurring in the Basin, which may affect water quality, or issues for native fish management, which as single datasets may not become apparent. What was required was a data atlas that collated all of the relevant datasets, including information about water quality, land use and key issues for native fish. This dataset was displayed at two spatial levels, the basin as a whole and a ‘focus’ catchment. The Broken River/Creek catchment in Victoria was selected to act as a focus or demonstration catchment, to highlight differences and issues between spatial scales.

## Project Context

The Murray-Darling Basin Commission’s *Integrated Catchment Management Policy* reflects a commitment by the community and government, to the ecologically sustainable

management of the Basin and its resources. Healthy rivers and healthy ecosystems and catchments are among the goals of the Policy.

Developed in the context of the ICM Policy, the vision of the MDBC's Draft Native Fish Strategy 2002-2012 is to ensure the Basin sustains viable fish populations and communities throughout its rivers. 13 objectives have been developed and this project addressed in particular objective 3:

*Improve key aspects of water quality that affect native fish.*

To enable better management of native fish, information about fish and the activities and events that influence fish populations needs to be readily available to the managers, scientists and community groups responsible for native fish conservation and management. This project aimed to highlight issues relating to water quality and fish populations that would enable future projects to highlight what those key aspects of water quality are that need to be improved.

### **Purpose of the Project**

Native fish species in the Murray-Darling Basin have suffered serious decline in both distribution and abundance since European settlement. There are a variety of factors contributing to this, including predation and competition from exotic fish, water and thermal pollution, as well as general habitat deterioration but an expert panel have suggested the two main factors are habitat loss and lack of environmental flows. Native fish population regeneration is thus a high priority in the work of the Murray-Darling Basin Commission.

To address the pressures on native fish, the Commission has revised and extended the existing Fish Management Plan for the River Murray and re-issued it as a Native Fish Strategy for the Basin. This Strategy aims to integrate instream habitat planning, management and research across the Basin. The outcomes of this project are central to the implementation of the objective on water quality under the Native Fish Strategy, so that key information is at hand for scientists, managers and community groups to ensure native fish and their habitats are managed with the best available information.

### **Project Objectives**

This project's objectives were to:

1. Collate data, identify and map regions, landscapes, land uses and industries that are important causes of water quality problems in the Basin;
2. Evaluate available data for relevance and quality, and identify significant gaps;
3. Report on issues relevant to filling the data gaps; and
4. Determine a meaningful scale/accuracy for reporting based on available data and quantitatively report on land use (distributed and point source) contributions to water quality problems on a third order catchment basis.

### **Project Tasks**

This project was essentially a desktop review and Geographic Information System (GIS) data atlas formation exercise, which identified potential water quality problems affecting fish or fish habitat within the Basin.

The project tasks included:

1. Developing a classification of land uses/management practices in relation to water quality impacts;

2. Identifying existing relevant datasets and projects, including the MDBC GH&D water quality project, and National Land and Water Resources Audit data/projects;
3. Coordinating with other current projects that might be developing relevant data, including the Commission's Landmark suite of projects;
4. Evaluating available data for relevance and identify gaps;
5. Compiling existing data and analyzing it at a relevant scale, ideally, by third order catchment;
6. Preparing a list of project ideas for future studies to fill any knowledge gaps identified; and
7. Reporting findings on a catchment basis.

## Summary of Analysis and Recommendations for Future Studies

### 1.1 Summary of Analysis

An analysis of the data contained in the project was undertaken. At a Basin wide scale the likelihood of issues for native fish from water quality changes are highest in the following catchments of the Murray-Darling Basin:

- Gwydir River;
- Namoi River;
- Murray (Hume to Border);
- Murrumbidgee River;
- Loddon River;
- Broken River;
- Goulburn River; and
- Campaspe River.

At a finer scale, in the Broken River/Creek Catchment, it is concluded from the available data that the following reaches are more susceptible to water quality problems that may impact native fish:

- Downstream of the major storages, Lake Nillahcootie and Lake Mokoan;
- Upper reaches of the Broken Creek catchment, particularly upstream of Tungamah;
- Reaches through irrigation areas of the lower catchment, around Numurka; and
- Reaches through irrigation areas along the Broken River from Benalla to Goorambat.

In summary, these layers showed that the watercourses in the upper reaches of the Broken Creek catchment, particularly upstream of Tungamah and adjacent to the irrigation areas near Numurkah, were more likely to have poor catchment condition in terms of pesticide hazard, sediment load, rivers in salinity hazard and rivers in acid hazard. The water condition index suggested that water quality was more likely to be an issue in this area as well as the areas downstream of Lake Mokoan.

It is within these areas that more detailed studies could be undertaken, to assess which native fish species occur there and what aspects of their lifecycle are undertaken in those waters.

## 1.2 Limitations of Existing Data

Limitations relating to the scale of data capture, available analysis of data and actual data available were encountered constantly during the project. Even though there are numerous data sets which appear to be available for incorporation into a project such as this, many of the key data sets are either not spatially referenced, are incomplete in their coverages or the data sets are incomplete in their population of data. These limitations and issues have been highlighted during the previous discussion of the individual datasets used and are summarised in Figure 17.

**Figure 17 Data Types, Issues And Recommendations Summary**

<b>DATA TYPE</b>	<b>ISSUE</b>	<b>COMMENT</b>	<b>RECOMMENDATION</b>
Land Use	Scale of data capture	Scale greater than 1:100,000 not appropriate for analysis at catchment scale	Detailed land use coverages are required to allow catchment scale land use analysis
Water Quality Data	Lack of analysis of data	Raw data is not useful for this type of analysis	Additional analysis of data from monitoring programs needs to be undertaken with results in form to fit into spatial dataset
Basin-Wide Audit Data	Scale of data	Large grid size (5km <sup>2</sup> ) too large for catchment analysis	Audit data be only used for "first-cut" analysis
Fish Ecology, Distribution and Abundance	Lack of available data	No digital spatial data found through project investigations. NSW Fishfiles only accessible information.	Fish projects need to work on producing spatial datasets

The limitations tend to be based around several problems:

- Information that has been collected relating to water quality but is not spatially referenced or extended or converted to a spatial coverage;
- Collection of data for the same parameter but collected via a different method at a different scale, often varying across state boundaries;
- Incomplete coverages even within a catchment for key parameters;
- Incomplete data sets; and

- An almost complete lack of spatial coverages for native fish distribution or recognition of areas of high value for native fish such as identification of breeding areas and migratory routes.

### **1.3 Recommendations for Future Studies**

There could be many recommendations made for individual data sets relating to water quality and some have been highlighted in the previous sections, but as other agencies are attending to these, this project would suggest the following recommendations for future studies.

#### ***Spatial Data Relating to Fish Ecology, Distribution and Abundance***

The existing body of knowledge relating to fish distribution and ecology should be collated into spatially referenced data sets. This information could be initially captured via museum or collection specimen references and the development of a map of fish monitoring data for the Murray-Darling Basin. Every time fish monitoring is undertaken a record of when and where each specimen was encountered could be entered into a GIS. Such a project would allow the development of a spatial knowledge base to begin, without the need for the time and expense of additional field work to be undertaken.

Without knowledge of native fish populations and abundance, monitoring the success of the objectives of the Draft Native Fish Strategy will be limited.

#### ***Spatial Distribution of Water Quality Problems Affecting Native Fish***

Location specific data is collected on the water quality parameters affecting native fish discussed in section 3.1 however the spatial extent and distribution of many of these parameters is not currently well known across the Basin. For example it is considered that cold water pollution can depress water temperature by at least 5°C for more than 250 km downstream of some dams (WWF, 2001). No spatial data mapping the possible spatial extent of this impact across the Basin was found during this project's investigations. The availability of such a coverage may highlight the severity of cold water pollution.

Similarly using flow information and channel capacities, where known point sources of pollution emit to water, the distribution of pollutants and thus potential impacts on native fish could be assessed.

#### ***Update and Maintenance of MDBC Weir Information System***

The MDBC Weir Information System (WIS) has the potential to store a large amount of information that would be extremely valuable for managers and scientist making decisions that might have impacts on native fish. Information relating to fish migration (distances to upstream and downstream barriers and the presence of fishways), water quality, the presence of native fish would be extremely valuable.

When weir visits are made or future works are undertaken, ensuring the proforma for information developed as part of the WIS project, is collected and updated will populate the WIS database with valuable information. Some of this information may be beneficial to a spatial dataset relating to native fish distribution and abundance.