

# Queensland's approach to the control of exotic pest fishes

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## ABSTRACT

Sixteen species of exotic fish have become established in Queensland fresh waters. Three species or species groups pose a significant risk to Queensland's aquatic systems. These are carp, tilapia and *Gambusia* which are listed as noxious under the Queensland Fisheries Act 1994. While there is little doubt that carp and tilapia have successfully invaded Queensland waters, there is a great deal of conjecture as to the extent of their impact on aquatic systems. Much of the information relating to the impacts of these species is based on anecdotal evidence, highlighting the need for more research. *Gambusia* is known to be an aggressive species and has been implicated in the decline of a number of small native fishes.

A Queensland strategy 'Control of Exotic Pest Fishes—an operational strategy for Queensland freshwaters (2000–2005)' was developed after significant community consultation and input from numerous stakeholders both within Queensland and interstate. It aims to provide direction and focus for a uniform approach to pest fish management in Queensland and to link with other state and national strategies. It recognises that broad-scale eradication is not possible at this stage and priority is given to controlling the spread of exotic pest fish in Queensland. This Strategy, based on the principles of integrated pest management, recognises that owing to a lack of data, control programmes should be undertaken within an adaptive management framework. A number of priority actions were identified and have been implemented during the development of the Strategy. These include a statewide education and extension strategy, a pest fish database and the development of pilot regional plans in priority areas.

## 1. INTRODUCTION

There is significant community concern about the spread of exotic pest fish in Queensland waters. In response, the Queensland Fisheries Service (QFS) initiated the development of the Strategy which was released in February 2001.

There are 16 species of exotic fish that have formed significant self-maintaining populations in Queensland waters (Arthington et al. 1999). From this group, carp (*Cyprinus carpio*), *Gambusia* (*Gambusia holbrooki*) and two species of tilapia (*Oreochromis mossambicus* and *Tilapia mariae*) are listed as noxious

in Queensland (Queensland Freshwater Management Plan 1999). These fishes are considered to pose the greatest threat to Queensland waters at the moment. It is acknowledged, however, that any species of fish that has formed a self-maintaining population has the potential to become a pest (Arthington et al. 1999).

Very little information is available on the impacts of exotic species on native fish populations. However, impacts may include competing with native fishes for food or space, eating native fish eggs and fry, or in some instances behaving aggressively toward native fishes (Bluhdorn et al. 1990; Lloyd 1990; Koehn et al. 2000). There is also evidence that some exotic species cause habitat degradation (Koehn & O'Conner 1990).

Carp are known to be present in the Logan and Albert catchments (southern Queensland) and the Queensland section of the Murray-Darling Basin (Queensland Department of Primary Industries 2001). There is concern they are also present in other areas of the State, although this is unconfirmed. The Mozambique mouthbrooder (*Oreochromis mossambicus*) is present in a number of coastal drainages throughout Queensland. In addition, significant populations also occur in and around Cairns, Townsville and Brisbane (Queensland Department of Primary Industries 2001). The Mozambique mouthbrooder has very wide environmental tolerances, although it is thought its distribution is limited by temperature and that Brisbane represents its southern limit (Arthington et al. 1984). The black mangrove cichlid (*Tilapia mariae*) is currently found only in north Queensland (Arthington et al. 1999). Both carp and tilapia have very successful reproductive strategies and often become the dominant species in a habitat. *Gambusia* (mosquito fish) is the most widely distributed exotic species in Queensland and is thought to be present in up to 90% of urban creeks (Queensland Department of Primary Industries 2001). *Gambusia* are very aggressive and 'fin-nip' native fish species. They are livebearers and have been implicated in the decline of a number of small native fishes (Lloyd 1990).

While the legislation pertaining to noxious and non-indigenous fish in Queensland is quite comprehensive, it has done little to reduce the spread of these fishes. The Strategy aims to support the legislation and to address community concerns about exotic pest fish and their impacts.

## 2. HISTORICAL MANAGEMENT OF PEST FISH IN QUEENSLAND

Prior to 1998, management of pest fish in Queensland was done on an ad hoc basis. There were a number of small-scale eradication attempts using pesticides and in some cases netting. Some noxious fish education material was produced and distributed, as part of a wider fisheries education programme. However, there was no coordinated pest fish education strategy. Actions relating to pest fish management were limited to those species listed as noxious and no provision was made for potential pest species.

### 3. STRATEGY DEVELOPMENT

The Strategy was developed by the QFS in consultation with the Community Consultative Committee for the Control of Exotic Pest Fish (CCC). The CCC was set up in March 1999 with the specific objective of developing a pest fish strategy for Queensland. The CCC comprises representatives of the key stakeholder groups such as the peak body for recreational fishers and stocking groups, the commercial fishing industry, local government, catchment organisations, conservation groups, the aquarium industry and other government agencies. An independent chair was appointed by the Executive Director of Fisheries. The CCC has an ongoing role in monitoring the implementation of the Strategy.

The Strategy has close links and shared goals with the National Management Strategy for Carp Control 2000–2005 (Carp Control Coordination Group 2000) and forms the 'fish' component of the soon-to-be-released Queensland Pest Animal Strategy 2000–2005.

### 4. THE STRATEGY

The emphasis of the Strategy is on controlling those exotic species already established in the wild and on preventing new infestations.

The Strategy recognises that broad-scale eradication is not possible at this stage so priority is given to controlling the spread of exotic pest fish in Queensland. The Strategy is based on the principles of integrated pest management and acknowledges that owing to the lack of data, control programmes should be undertaken within an adaptive management framework.

The Strategy has the following goals:

- Prevent the further spread of exotic pest fish species already established in Queensland waters and prevent the establishment of additional species in the wild.
- Reduce the impacts of existing wild populations of exotic pest fishes to acceptable levels and eradicate where possible.
- Ensure the environmentally and socially acceptable application of exotic pest fish eradication and control programmes.
- Establish community understanding of the impacts of exotic pest fishes and the management strategies to counteract these impacts.
- Ensure that exotic pest fish management is undertaken in accordance with best practice management and is underpinned by science and evaluation.
- Coordinate State management of exotic pest fishes with national management strategies.

The Strategy also sets out clear roles for local government, community organisations, communities and individuals. At the national level it is necessary to ensure that state and national initiatives are properly integrated. At the state level the Strategy aims to provide effective and uniform institutional and legislative frameworks and to coordinate, develop and implement policies and programmes. It also recognises a need to prioritise areas for action and develop

regional plans to establish initial goals for control actions within a prescribed geographical area. The regional planning process is the major tool for translating the goals and objectives of the strategy into actions.

The following priority actions are set out in the Strategy:

***Develop and implement an education and awareness programme***

The Queensland Fisheries Service has developed and is in the process of implementing an Education and Extension Programme. The ultimate objective of this programme is to stop the spread of exotic pest fish in Queensland and gain public acceptance of control measures. To achieve this it is necessary to stop people moving exotic pest fish from one water body to another, either inadvertently or deliberately, and stop people dumping aquarium fish in waterways. Reporting of exotic pest fish outbreaks to the relevant authorities is also important. The Education and Extension Programme encompasses both adults and children. A range of materials has been produced including posters and brochures on carp and tilapia, catchment management and ornamental fish. The Queensland Fisheries Service is also developing a curriculum-based module for schools. An important part of raising awareness involves effective use of the media. The Queensland Fisheries Service has been very successful in obtaining newspaper, magazine and radio coverage and plans to shoot video footage of pest fish for television community service announcements.

***Establish a database on the distribution of pest species in the wild***

The Queensland Fisheries Service commissioned the Department of Natural Resources and Mines (NRM) to develop a spatial database linked to an information system. This database, *PestInfo: Fisheries edition*, was designed to record aquatic pest infestations and output maps, producing a visual record of the infestation. The outputs of *PestInfo: Fisheries edition* can be used to interpret data, enabling a better understanding of the nature of infestations throughout the State. This information will contribute to the implementation of the Strategy. *PestInfo: Fisheries edition* will also be used as an evaluation tool to measure how effective the Strategy has been in controlling the spread of exotic pest fish.

***Develop a response system for preventing new infestations***

The Queensland Fisheries Service is developing a rapid response system with input from the Murray-Darling Basin Commission. This system is being trialed in the Haughton River catchment and the upper reaches of the Murray-Darling Basin.

***Develop a protocol for determining priority areas for action and use it to identify the areas***

Queensland is using an approach similar to that set out in 'Ranking areas for action: a guide for carp management groups' (Braysher & Barrett 2000). At this stage, priority is given to areas that are in imminent danger of invasion from pest fish.

***Develop a regional planning process and pilot the process in priority catchments***

Regional plans are in their final stages for the Barron and Mitchell catchments in north Queensland and the Burnett catchment in southeast Queensland. In both regions, tilapia are likely to invade uninfested areas as a result of water transfers. There has been significant community and government agency involvement in the development of both these plans, however a different approach has been taken in each case. A consultant is developing the Burnett plan and the Barron/Mitchell plan is being developed by QFS. At this stage it is difficult to assess which has been the more successful and cost-effective approach.

The Queensland Fisheries Service has also been involved in developing and implementing the Logan and Albert Carp Management Plan, a process led by the Murray-Darling Basin Commission.

***Develop a research strategy for the control of exotic pest fish***

A research sub-committee of the CCC has been set up and is in the process of establishing research priorities. It is difficult at this stage to attract funding for pest fish research and there are a number of very large information gaps. However, it is hoped that once a research strategy has been approved it will encourage research into pest fish.

***Input into the development of a strategy for the control of the trade and movement of exotic pest fish***

This is progressing at a federal level and Queensland has representation on the committee dealing with this issue.

## 5. CONCLUSION

It is difficult to assess the success of the Strategy at this early stage. However, it is very encouraging to see how enthusiastically the community has embraced the Strategy and how the members of the CCC are actively promoting and defending the document. It is also encouraging that the Strategy is being recognised as a suitable framework for pest fish control projects throughout Queensland. Additionally, it demonstrates the willingness of state agencies within Queensland to collaborate and share knowledge with respect to pest management. It must be acknowledged, however, that community goodwill will continue only if the strategy is implemented quickly and effectively. The Strategy incorporates a number of performance indicators and will undergo a full review in 2005.

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