Department of Sustainability and Environment

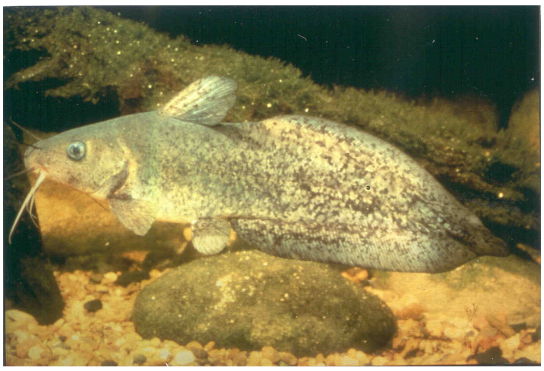
Action Statement

Flora and Fauna Guarantee Act 1988 No. 201

Freshwater Catfish
Tandanus tandanus

Preamble

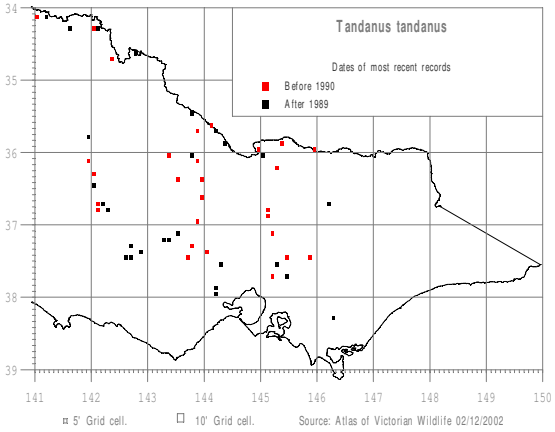
The information contained within this Action Statement has been collated from a number of sources (as listed in the reference section of this document). Most of the information, however, has been largely derived from two documents: *Freshwater Catfish: A Recovery Plan* (Clunie and Koehn 2001a) and *Freshwater Catfish: A Resource Document* (Clunie and Koehn 2001b). Both of these documents, as well as this Action Statement, have been written to provide background information and a list of achievable goals to natural resource managers with the aim to address the decline in distribution and abundance of this species.



Freshwater Catfish (*Tandanus tandanus*)

Description and distribution

The Freshwater Catfish (*Tandanus tandanus* Mitchell 1838) is a stocky species with a stout tapering body formed by the joining of the second dorsal, caudal and anal fins into a continuous median fin. The species has a large head with a blunt rounded snout. The mouth has thick fleshy lips and is surrounded by four pairs of barbels. The skin is scaleless, smooth and tough, and there is a strong, serrated spine in the first dorsal fin and pectoral fins. The pelvic fins are abdominal and rounded (Cadwallader and Backhouse 1983). Although colour varies with age and locality, Freshwater Catfish are usually light to dark greyish to greyish-green dorsally and laterally, and lighter to white ventrally. The body colour continues on to the fins. Smaller specimens have darker mottling which usually fades as they grow. Larger specimens sometimes have pale yellowish mottling on the posterior half of body. Freshwater Catfish can grow to 900 mm and 6.8 kg, although they usually reach 500 mm and 1.8 kg. From one year of age, the sexes can be distinguished by the shape of the urinogenital papilla, which is cylindrical in males and triangular in females (Cadwallader and Backhouse 1983).



Distribution in Victoria

Victoria
The Place To Be

Freshwater Catfish are native to the Murray-Darling River system in south-eastern Australia (SA, Vic, NSW, Qld), and to coastal drainages in eastern Australia from central NSW to northern Queensland. In Victoria, Freshwater Catfish have been recorded from the tributaries of the Murray River and associated waters, including the Ovens River, Broken River, Goulburn River, Loddon River and Avoca River (Murray Riverina), as well as from the Mallee. Freshwater Catfish have been introduced into four other river basins, the Wimmera, Richardson, La Trobe and Yarra Rivers (all outside their natural range), and several lakes, including Goldfields and Centenary reservoirs, Lake Victoria in Maryborough, Amphitheatre Reservoir near Avoca and Lexton reservoir. Currently there are believed to be only four self-sustaining populations of Freshwater Catfish in Victoria: the Wimmera River, Richardson River and Lake Victoria (all introduced populations) and Cardross Lakes near Mildura (a series of terminal lakes with an artificially high water level due to runoff from irrigation water drainage). Elsewhere, there are now only occasional records of the species from within its natural range. Reasonable numbers still occur within the lower Murray River (NSW waters) adjacent to Victoria. More detailed information on the appearance and distribution of this species can be obtained in Clunie and Koehn, (2001a).

Habitat

The Freshwater Catfish is a benthic species, found in a range of habitat types such as rivers, creeks, lakes and billabongs (Cadwallader and Backhouse 1983). While fish are apparently more abundant in lakes and backwaters (Lake 1967b), the species does inhabit and spawn in flowing streams (Merrick and Schmida 1984). A survey in northern Victoria found that Freshwater Catfish only occurred in standing waters such as lakes if there was low turbidity and abundant aquatic plants (Brumley *et al.* 1987). Other sites where populations are known to exist in Victoria (such as Cardross Lakes and Lake Victoria) also possess abundant submerged and emergent aquatic plants. Habitat in Lake Victoria is shallow, to 1.5-2 m deep, with some deeper holes, and a substrate of stones, gravel and silt. The preference of Freshwater Catfish for this habitat structure clearly indicates the conditions which must be maintained to provide suitable sites for sustainable Freshwater Catfish populations.

Life history and ecology

Reproduction

Freshwater Catfish spawn from spring to summer in water temperatures above 24ºC (Lake 1967a, Davis 1977). In Lake Victoria, however, spawning was recorded in water temperatures from 21ºC to 28.6ºC (Clunie, pers. obs.). Although rising water levels may hasten spawning, they are not a necessary trigger (Lake 1967a). Spawning may occur in flooded and shallow areas of large rivers or quieter backwaters, as well as in farm dams.

Pair formation occurs prior to spawning. The pair constructs a saucer-shaped depression, 0.5 – 2.0 m in diameter, in the substrate, usually in areas of coarse sand, gravel or rocks, and occasionally in mud and silt. If a suitable substrate is not available, material such as sticks and gravel may be collected from the surrounding area (Cadwallader and Backhouse, 1983). In Lake Victoria, nests have been recorded in water depths ranging from 0.35 m to 1.6 m (usually <1 m). Spawning occurs 1-4 weeks after nest construction, and is often preceded by elaborate courtship behaviour. The female then deposits the eggs within the nest before leaving. The male remains by the nest, continually fanning the eggs to remove silt and debris, and guarding them against predation. Several males may use a single nest site during the breeding season, and males may attract multiple females to the one nest (Clunie and Koehn, 2001a). The eggs are spherical, demersal, non-adhesive, light green to yellow, and about 3.2 mm in diameter when water-hardened. Up to 20,000 eggs are laid, and they hatch after approximately seven days. The larvae are free swimming by 12-14 days and feeding by 20 days (Lake 1967a).

Freshwater Catfish are carnivorous, and feed on a wide variety of organisms including insects (particularly chironomids), molluscs, worms, shrimps, yabbies and small fish such as gudgeons (Cadwallader and Backhouse 1983)

Conservation status

National conservation status

The Freshwater Catfish has not been listed under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999.*

Victorian conservation status

Freshwater Catfish is listed as threatened under the *Flora and Fauna Guarantee Act 1988* (FFG Act).

It is considered endangered in Victoria according to DSE's *Advisory list of Threatened Vertebrate Fauna in Victoria - 2003* (DSE 2003).

Freshwater Catfish is listed under the FFG Act based on the following criteria:

Criterion 1.1 ***The taxon is in a demonstrable state of decline which is likely to result in extinction.***

Cadwallader and Backhouse (1983) noted that, like many of the larger Murray-Darling fish, the Freshwater Catfish has suffered a marked decline in natural range and abundance. It has contracted largely to the north west of its natural range and is restricted to a small number of sites. Freshwater Catfish have been introduced at several sites in western Victoria and these populations appear to be stable. It was formerly a valuable commercial species, and has become virtually extinct upstream of Lake Mulwala (Cadwallader 1986)

Criterion 1.2 ***The taxon is significantly prone to future threats which are likely to result in extinction.***

Alterations in water level affect nest establishment and breeding success in Freshwater Catfish. Sudden short-term drops in water level may expose nests, which are subsequently abandoned. If water levels fluctuate too often, Freshwater Catfish will not spawn (Lake, 1967a).

Freshwater Catfish require specific temperatures for spawning, and so alterations to temperature regimes in rivers and streams may threaten the species' breeding activity. Siltation of waterways, as a result of clearing and poor land management practices, may also affect spawning success.

Because Freshwater Catfish maintain populations without having major upstream spawning migrations, localised events such as overfishing, pollution or destruction of spawning areas by river channelisation and desnagging are likely to seriously depress or destroy local populations (Reynolds 1983). Interspecific competition with European Carp (*Cyprinus carpio*) may be a threat as both species feed at the same trophic level (Hume *et al.* 1983).

It should be noted that:

1. Alteration to the natural flow regimes of rivers and streams
2. Alteration to the natural temperature regimes of rivers and streams
3. Increase in sediment input into Victorian rivers and streams due to human activities
4. The introduction of live fish into waters outside their natural range within a Victorian river catchment after 1770
5. Removal of wood debris from Victorian streams

are listed as potentially threatening processes under the *Flora and Fauna Guarantee Act 1988.*

Decline and threats

Freshwater Catfish have undergone a widespread decline in range and abundance throughout much of the Murray–Darling River system, as well as in Victoria, in recent decades. The reasons for this decline are not clearly understood as interactions between threatening processes are extremely complex. The following threats, however, are considered to be the most significant in the decline of this species. It should also be noted that, while these threats have been listed in order of most significant to least significant threat, the priority of these threats may vary for individual populations: their importance should be assessed on an individual basis for each population.

Changes to flow regimes/loss of floodplain habitat

The preference of Freshwater Catfish for slow flowing or still water suggests that changes to these conditions may be detrimental to their continued survival. In regulated systems, increased flows for irrigation generally occur during summer-autumn periods when natural flow levels are low. Although the exact effects of this flow reversal on Freshwater Catfish are not known, anecdotal evidence suggests that waters with natural flow regimes (such as the majority of population sites in Queensland) support the largest Freshwater Catfish populations within Australia. Changes to flow regimes generally also reduce the extent and duration of natural flooding, resulting in a loss of floodplain wetland habitat. Freshwater Catfish have been observed using floodplains, but the extent of this usage is largely unknown. Furthermore, high summer irrigation flows may coincide with Freshwater Catfish spawning, potentially increasing the mortality rate of eggs and larvae by washing them downstream. High flows also increase bank erosion/ sedimentation which may be detrimental to spawning success. Rapid reductions in water levels may cause fish to abandon nests (Clunie and Koehn 2001a)

Changes to temperature regimes

Cold water release from dams may lead to localised extinctions downstream of large dams if waters consistently fail to reach suitable spawning temperatures (24°C) during spring and summer. Reduced water temperatures may also affect general metabolic functioning and growth (Ryan *et al.* in prep). Feeding and maturation may also be affected in colder (and therefore less productive) ecosystems.

Loss of aquatic vegetation

Victorian populations of Freshwater Catfish are generally associated with dense aquatic vegetation (particularly submerged vegetation). The loss of aquatic vegetation may affect this species through the direct loss of habitat (particularly for shelter from high water velocities), and through declines

in the availability of refuge areas for larvae and juveniles to shelter from predation. Adults may also use aquatic vegetation as cover while seeking prey. Furthermore, a decline in aquatic vegetation is likely to decrease the availability of food resources such as aquatic invertebrates.

Sedimentation

In the initial phase of nest preparation, Freshwater Catfish remove any sediment which blankets the substrate, and attempt to provide the nest with a pebble/gravel substrate. After egg deposition, Freshwater Catfish constantly fan their nests, presumably to keep them clear of sediment. This behaviour suggests that sedimentation may be a significant threat to this species, particularly during the breeding season when eggs and larvae are prone to suffocation. Sedimentation of the substrate also reduces aquatic macroinvertebrate diversity (which provides a food resource for this species).

Introduced species

Introduced fish may have an impact on Freshwater Catfish. Effects of Common Carp (*Cyprinus carpio*) on the environment can include increased water turbidity, siltation, and erosion of streambanks; this may affect the ability of Freshwater Catfish to maintain a silt-free nest site (which is assumed to be necessary for egg development). Carp may also decrease aquatic macrophyte density and diversity (sites supporting good populations of Freshwater Catfish within Victoria generally support a healthy assemblage of aquatic macrophytes). Carp are also likely to increase water nutrient loads and algal concentrations. Such impacts could directly affect Freshwater Catfish in terms of reproductive success, feeding behaviour and food availability. Redfin (*Perca fluviatilis*) prefer the same type of habitat as Freshwater Catfish, and therefore may compete for food and resources. Redfin may also directly prey on Freshwater Catfish or transmit diseases. Redfin are also likely to prey upon eggs and larvae, and have been observed investigating Freshwater Catfish nests (Clunie and Koehn 2001a)

Removal of snags

Removal of woody debris may also impact on Freshwater Catfish through the loss of low velocity refuge areas and refuge habitat in times of low flow.

Riparian vegetation loss

Degradation and loss of riparian vegetation may adversely affect instream habitat used by Freshwater Catfish through the loss of shade and organic inputs, increased runoff, erosion, streambank slumping and sedimentation. The availability of habitat such as undercut banks and tree roots may also be reduced.

Barriers to movement

Although Freshwater Catfish are not known to undertake large-scale movements, barriers to fish passage may restrict the localised movement of Freshwater Catfish within populations, thereby potentially isolating populations. Larvae and juveniles may be more susceptible to being damaged by downstream movement over barriers.

Salinity

Freshwater Catfish appear to be tolerant of increasing salinity in some waters. However, the impact of increasing salinity, including sublethal effects, requires investigation (Clunie and Koehn, 2001a).

Disease

Very little is known about the prevalence of diseases in Freshwater Catfish or the possible role diseases may have played in the species' decline. This is primarily because Freshwater Catfish has not been a significant aquaculture species. Three diseases and one parasite have been identified as being a potential threat to Freshwater Catfish (Clunie and Koehn 2001a). These are Epizootic Haematopoietic Necrosis Virus (EHNV), Viral Encephalopathy and Retinopathy (VER), Goldfish Ulcer Disease (GUD), and Asian Fish Tapeworm.

Recreational Fishing

Some Freshwater Catfish populations may be subject to high fishing pressure, and recolonisation may be limited due to localised movements of this species. The species may also be more susceptible to capture during the breeding season in areas where nests are visible.

Existing conservation measures

- Because the Freshwater Catfish is threatened in Victoria, taking of the species is prohibited in all Victorian waters except for those within the Wimmera River Basin, where there is a minimum legal size of 30 cm and a bag limit of two fish.
- A management options study has been completed for Cardross Lakes to identify options to protect the Freshwater Catfish population as well as other high conservation values of the lakes (such as other threatened fish species and important migratory bird habitat) (Ryan *et al.* in prep).
- Research on the biology and habitat requirements of Freshwater Catfish has been

conducted at Lake Victoria (Maryborough) (Clunie and Koehn 2001a).

- Freshwater Catfish have been introduced into Goldfields and Centenary Reservoirs in Maryborough, Amphitheatre Reservoir near Avoca and Lexton reservoir in attempts to create self-supporting populations

Conservation objectives

Long-term objective

To ensure that the Freshwater Catfish can survive, flourish and retain its potential for evolutionary development in the wild.

Objectives of this Action Statement

1. Establish the extent and density of populations of Freshwater Catfish at a minimum of six sites within Victoria to ensure adequate baseline data is available for the assessment of management actions contained within this publication.
2. Ensure that management agencies and key stakeholders are aware of the presence of significant populations of Freshwater Catfish, and that the species' conservation needs are included in relevant management programs.
3. Assess and manage threats to Freshwater Catfish.
4. Ensure the provision of suitable water quality and quantity (supplied at appropriate times of the year) to sites supporting significant populations of Freshwater Catfish.
5. Investigate the use of re-introductions of Freshwater Catfish to improve the status of the species, and initiate at least two re-introductions into appropriate sites within Victorian waters.
6. Improve knowledge of the biology of Freshwater Catfish.

Intended management actions

The intended management actions listed below are further elaborated in DSE's Actions for Biodiversity Conservation system. Detailed information about the actions and locations, including priorities, is held in this system and will be provided annually to land managers and other authorities.

Objective 1. Establish the extent and density of Freshwater Catfish populations within at least six Victorian sites to ensure adequate baseline data is available for the assessment of management actions contained within this publication.

1. Undertake surveys of areas where extant populations are believed to occur to determine the status of the species in these areas.

Target: Develop a standardised (comparable) methodology for sampling within the first year of Action Statement publication and conduct surveys in historical and current range of the species to provide meaningful data within 5 years of publication of this Action Statement.

Responsibility: DSE (Biodiversity & Ecosystem Services), Department of Primary Industries (DPI) (Fisheries Victoria)

2. Monitor selected sites to determine the impact of management changes on Freshwater Catfish populations.

Target: Using standardised methodology (developed under Action 1), monitor population structure in at least five sites within the first 5 years of Action Statement publication

Responsibility: DSE (Biodiversity & Ecosystem Services), DPI (Fisheries Victoria)

3. Undertake a targeted angler survey (for the Wimmera River) at five yearly intervals to determine population trends. The survey could be co-ordinated with the annual Horsham Fishing Contest.

Target: Conduct creel census within 5 years of publication of this Action Statement and thereafter at least every 5 years afterwards or earlier if information suggests that the population structure has changed significantly.

Responsibility: DPI (Fisheries Victoria)

Objective 2. Ensure that management agencies and key stakeholders are aware of the presence of significant populations of Freshwater Catfish and that their conservation needs are included in relevant management programs.

4. Provide information and advice to management authorities such as Catchment Management Authorities, water authorities and local government authorities regarding the location and ecological requirements of all significant populations of Freshwater Catfish.

Target: Conduct education and awareness days (including printed information for dissemination) to appropriate target audience on a bi-yearly basis

Responsibility: DSE statewide services with assistance from Fisheries Victoria and DSE (Biodiversity & Ecosystem Services)

5. Develop and distribute a range of community awareness products (brochures, posters, media articles, talks) to promote Freshwater Catfish conservation.

Target: Prepare printed information and disseminate to relevant angling groups and wider community within 2 years of publication of this Action Statement and thereafter as deemed appropriate.

Responsibility: DSE (Biodiversity & Ecosystem Services)

Objective 3. Assess and manage threats to Freshwater Catfish.

6. Maintain current controls over angling. Review controls periodically, especially when new information about Freshwater Catfish distribution, population trends or the impact of angling is obtained.

Target: Review impacts of fishing on Freshwater Catfish every 5 years or more frequently if relevant information becomes available.

Responsibility: DSE (Biodiversity & Ecosystem Services), DPI (Fisheries Victoria)

7. Encourage the protection and rehabilitation of riparian zones in areas where significant populations of Freshwater Catfish occur.

Target: Liaise with relevant Catchment Management Authorities to facilitate the prioritisation of rehabilitation works (timing to coincide with Action 2)

Responsibility: DSE (Statewide Services), Catchment Management Authorities

8. Develop a priority list of dams for remediation works to reduce the impact of cold water pollution on significant Freshwater Catfish populations.

Target: Develop list within first year of Action Statement publication and liaise with relevant water authorities to facilitate remediation works

Responsibility: DSE (Biodiversity & Ecosystem Services, Water Sector Group), water authorities

Objective 4. Ensure the provision of suitable water quality and quantity (supplied at appropriate times of the year) to sites supporting significant populations of Freshwater Catfish.

9. Implement recommendations identified in existing flow management plans and ensure that those in development/planning phase incorporate consideration of needs for species such as Freshwater Catfish.

Target: Liaise with all relevant water authorities within the first year of publication to establish appropriate lines of communication, and thereafter on an annual basis or earlier if relevant streamflow management plans are being prepared.

Responsibility: DSE (Biodiversity & Ecosystem Services, Water Sector Group), Catchment Management Authorities, water authorities

Objective 5. Investigate the use of re-introductions of Freshwater Catfish to improve the status of the species, and initiate at least two re-introductions into appropriate sites within Victorian waters.

10. Assess feasibility of reintroduction within the natural range of Freshwater Catfish. If feasible, develop a re-introduction plan for this species. Issues to be addressed include site selection, numbers to be re-introduced, genetic considerations, threat management and monitoring.

Target: Develop a reintroduction plan within 3 years of publication of this action statement

Responsibility: DSE (Biodiversity & Natural Resources Division)

11. Based on the reintroduction plan, undertake at least two reintroductions in impoundments and riverine sites, in consultation with Fisheries Division of DPI and peak angling groups.

Target: Reintroduce Freshwater Catfish at 2 appropriate sites within 5 years of publication of this action statement

Responsibility: DSE (DSE (Biodiversity & Ecosystem Services), DPI (Fisheries)

Objective 6. Improve knowledge of the biology of Freshwater Catfish.

12. Undertake and/or facilitate research in regard to:
    - The impact of introduced fish species, particularly Common Carp and Redfin on Freshwater Catfish.
    - The impact of sedimentation.
    - The movement of Freshwater Catfish to determine if and when fish move, whether any environmental cues such as flow and temperature stimulate movement, and the species' ability to negotiate existing barriers and utilise fishways.

Target: Develop a research plan to address the research points above within 2 years and commence research actions within 5 years of publication of this action statement

Responsibility: DSE (Biodiversity & Ecosystem Services)

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Further information can be obtained from Department of Sustainability and Environment Customer Service Centre on 136 186.

Flora and Fauna Guarantee Action Statements are available from the Department of Sustainability and Environment website: http://www.dse.vic.gov.au

This Action Statement has been prepared under section 19 of the Flora and Fauna Guarantee Act 1988 under delegation from Professor Lyndsay Neilson, Secretary, Department of Sustainability and Environment, September 2005.

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