NSW GOVERNMENT

Tilapia Control Plan 2023

NSW free from the spread and further threat of tilapia

Contents

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Introduction

Purpose

The control plan provides a framework for the management and control of tilapia in NSW which will be reviewed after a period of 5 years.

It sets goals and priorities that will help improve NSW's overall ability to prevent and respond to new tilapia incursions and manage the negative impacts of established populations. It highlights areas that require further collaboration across agencies to help raise awareness within the community and to further drive the development and use of technologies in the management of this invasive species.

The control plan aims to:

- Prevent the further spread of tilapia across NSW and maintain existing 'tilapia-free' catchments.
- Increase community understanding of the impacts of tilapia and the community's role in management strategies.
- Support the research, development and implementation of effective control techniques.

Scope

This control plan applies to Mozambique tilapia *(Oreochromis mossambicus)*, and other species known as tilapia. It applies to all of NSW including an area where an established population is present.

An established population is one where eradication is not considered possible or feasible.

New detections and eradicable populations of tilapia in NSW will see the NSW DPI Freshwater Pest Fish Incursion Response Procedure being applied. However, this control plan does support the control and potential eradication of any tilapia populations found in NSW.

All stakeholders – government agencies, landholders and members of the community – play a valuable role in confronting the challenges and taking action to achieve the goals outlined in this control plan.

Objectives

Many different organisations are involved in pest management, education and research. This control plan is aligned with state and national strategies and plans in which the goals and objectives are applicable for tilapia management.

The *NSW Biosecurity Strategy* sets the overall direction for the management of animal pests and diseases in NSW aquatic environments. It is based on the principle that biosecurity is a shared responsibility.

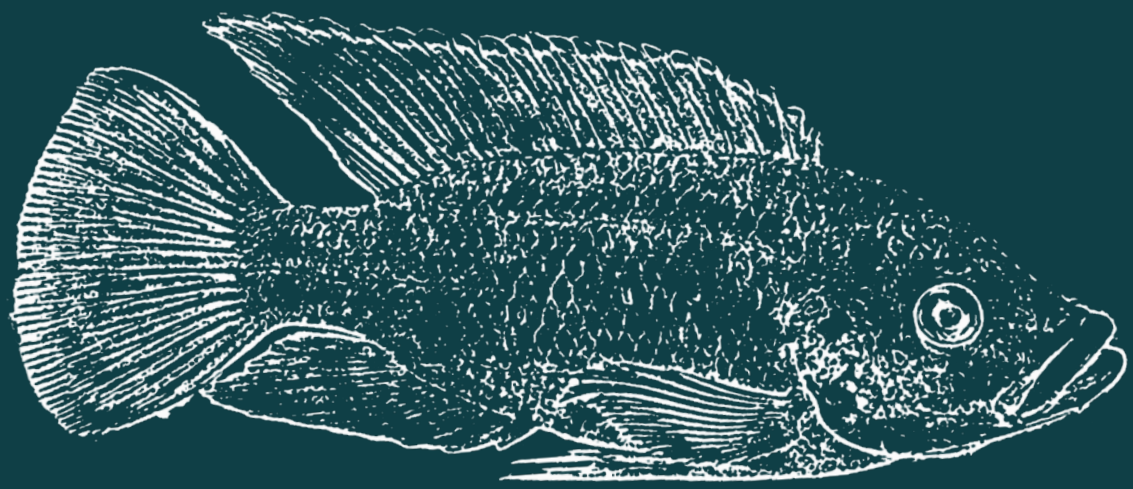
Under the *NSW Invasive Species Plan 2022-2027*, the key deliverables are to help prevent new incursions, eliminate or contain existing populations, and effectively manage already widespread invasive species.

The *NSW DPI and LLS Animal Biosecurity and Animal Welfare Joint Strategic Plan 2019-2023* highlights the need to enhance tools to improve intelligence, analysis and foresight as well as a need to increase focus on education efforts to improve knowledge, skills and compliance. *The NSW DPI Strategic Plan 2019-2023* also includes the protection and enhancement of NSW aquatic resources and environment as well as enhancing systems to drive investment, research, and monitoring and evaluation.

The *Australian Pest Animal Strategy 2017–2027* aims to improve early detection and response approaches for high-risk pest animals, minimise the impact of established pest animals and to develop the knowledge, capacity and commitment of stakeholders to take responsibility for pest animal management.

The *Centre for Invasive Species Solutions (CISS) Strategy 2021-2027* includes the need to evaluate, synthesise and share performance and impact of programs and projects in addition to being able to influence behaviour through improving education and communications that motivate action and enrich social licence.

The *National Environment and Community Biosecurity Research, Development and Extension Strategy 2021-2026* identifies the necessity to support outreach programs (for example, for school children, land managers) aimed at encouraging and facilitating a culture and desire to improve environments and communities through biosecurity-related action.



Invasive species management

Invasive species management can be classified under four approaches: Prevention, Eradication, Containment and Asset-Based Protection. These four approaches are aligned with the invasion process from arrival to widespread establishment.

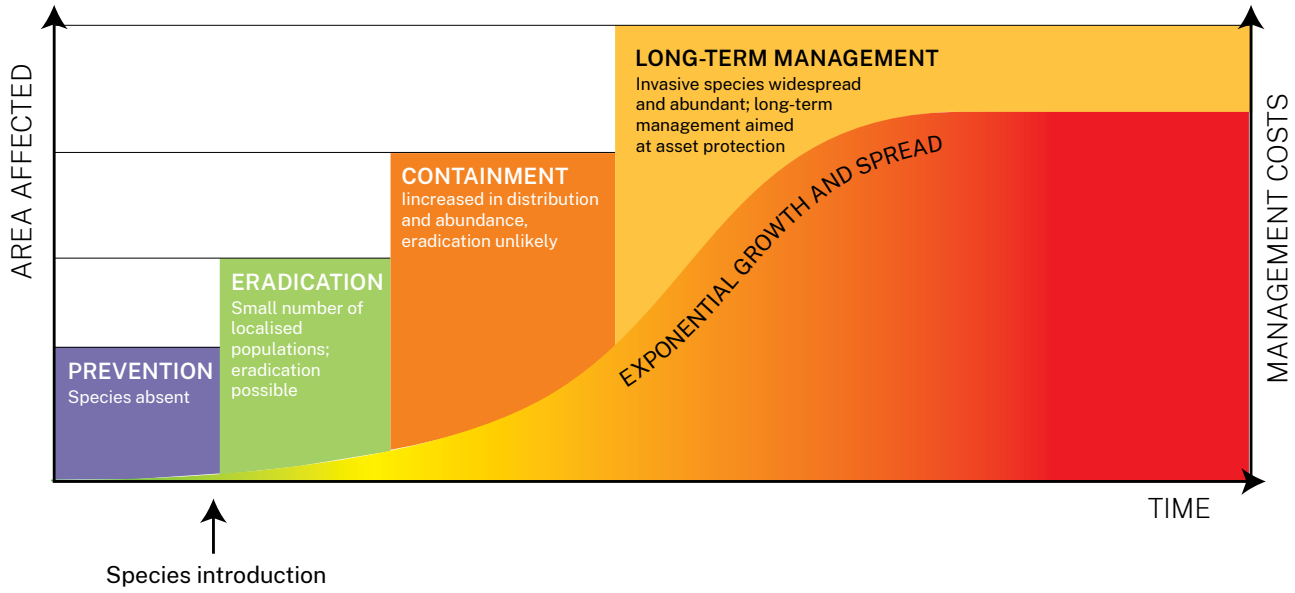


Figure 1: Generalised Invasion Curve. *Credit: Invasive Species Council based on version by Victoria Agriculture*

The most cost-effective way to minimise the impacts of invasive species is to prevent their incursion in the first instance. New incursions can colonise areas rapidly and successful control will be highly dependent on a rapid effective response. The challenge in the initial stages of establishment is to ensure early detection, reporting and rapid response by developing and deploying effective and efficient ways to eradicate or contain the introduced species before it becomes widespread. Once widespread, the eradication of pests is rarely practical.

The tilapia threat

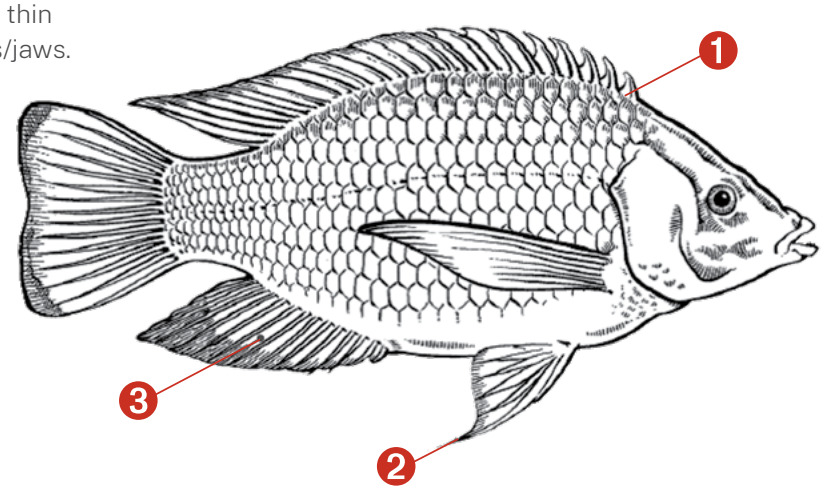
Tilapia “defined”

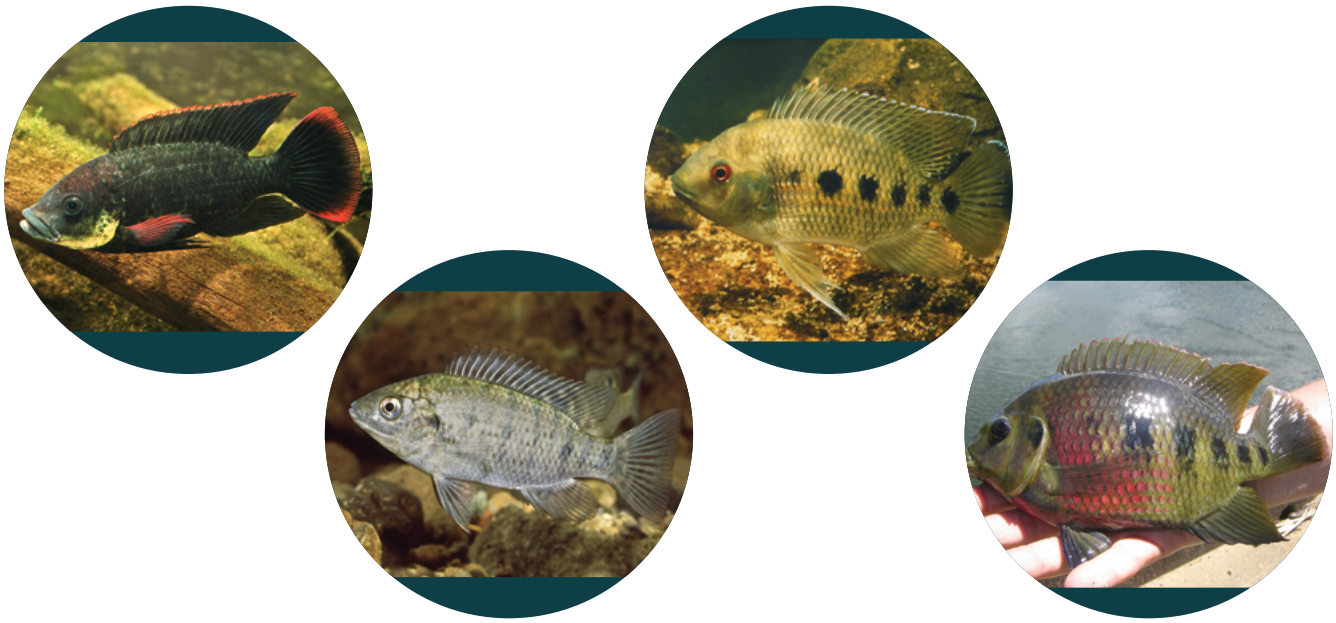
Tilapia is the common name for a large number of cichlid species. In particular, *Oreochromis*, *Pelmatolapia* and *Coptodon* genera, which have been found in Australia’s waterways.

Oreochromis mossambicus (Mozambique tilapia), *Pelmatolapia mariae* (Spotted tilapia) and *Oreochromis* hybrids will be referred to as tilapia or tilapias.

Identification

- Tilapia vary in colour from dark olive to silver-grey, depending on their age and environment.
- They are generally deep-bodied fish with thin profiles, long snouts and pronounced lips/jaws.
- Their dorsal (upper) fin ❶ is continuous and ends in an extended point. Most native species have a dorsal fin with a dent/gap in the middle and a rounded end.
- Their pelvic (belly) fins ❷ are long and almost touch the front of the anal (bottom) fin ❸. This is unlike most native species, which have short pelvic fins.





Figures 2–5: *(above left to right):* Tilapia identification – Male *Oreochromis mossambicus. Photo: Gunther Schmida*; Female *Oreochromis mossambicus. Photo: Gunther Schmida*; *Pelmatolapia mariae. Photo: Gunther Schmida*; *Pelmatolapia mariae. Photo: QLD DAF*

Top 100 worst invasive species in the world

O. mossambicus has been listed by the International Union for Conservation of Nature (IUCN) in their top 100 invader list.

Factors for successful invasion

In almost every region where tilapia has been introduced, success is due to:

- Tolerance to wide ranging ecological conditions.
- Wide diet variety – with the ability to adjust cranial and dental structures to accommodate available food.
- Rapid reproduction with parental care.
- Aggressive behaviour to compete with native fish.

Impacts

The impacts of a tilapia incursion:

- Damage to aquatic environment through habitat alteration
  - » *O. mossambicus* can clear several square meters of aquatic habitat for building breeding nests, which they aggressively defend *(Figure 6)*.
  - » *P. mariae* are known to move their young into a cleared surface, free of vegetation and silt where they defend their pit-like nest.
- Disappearance of native species
  - » Outcompeting for food sources and optimal habitat as well as predation on natives.
  - » Disturbance of aquatic environment, particularly natives that require aquatic vegetation and / or intact substrate for reproduction.

Figure 6: Tilapia Breeding Nests. *Photo: QLD DAF*

Established populations

O. mossambicus was originally found in impoundments in south-eastern Queensland and has been found in the Townsville region in urban drains and ornamental ponds. Further north, it is known to exist in catchments in the Cairns area, including the Atherton Tablelands and in the Burdekin River south of Townsville. *O. mossambicus* have now spread to many catchments within Queensland, including all the catchments that border the Murray-Darling Basin (MDB).

In NSW there is one known population of *O. mossambicus* in Cudgen Lake near Cabarita Beach on the NSW far north coast, first detected in 2014. *O. mossambicus* has not been detected in any other NSW waterway.

P. mariae was first discovered north-eastern drainage catchments in Queensland rivers from Innisfail to Cairns. It has also recently established in the Walsh River, Gulf of Carpentaria. It is not known to be present in NSW.

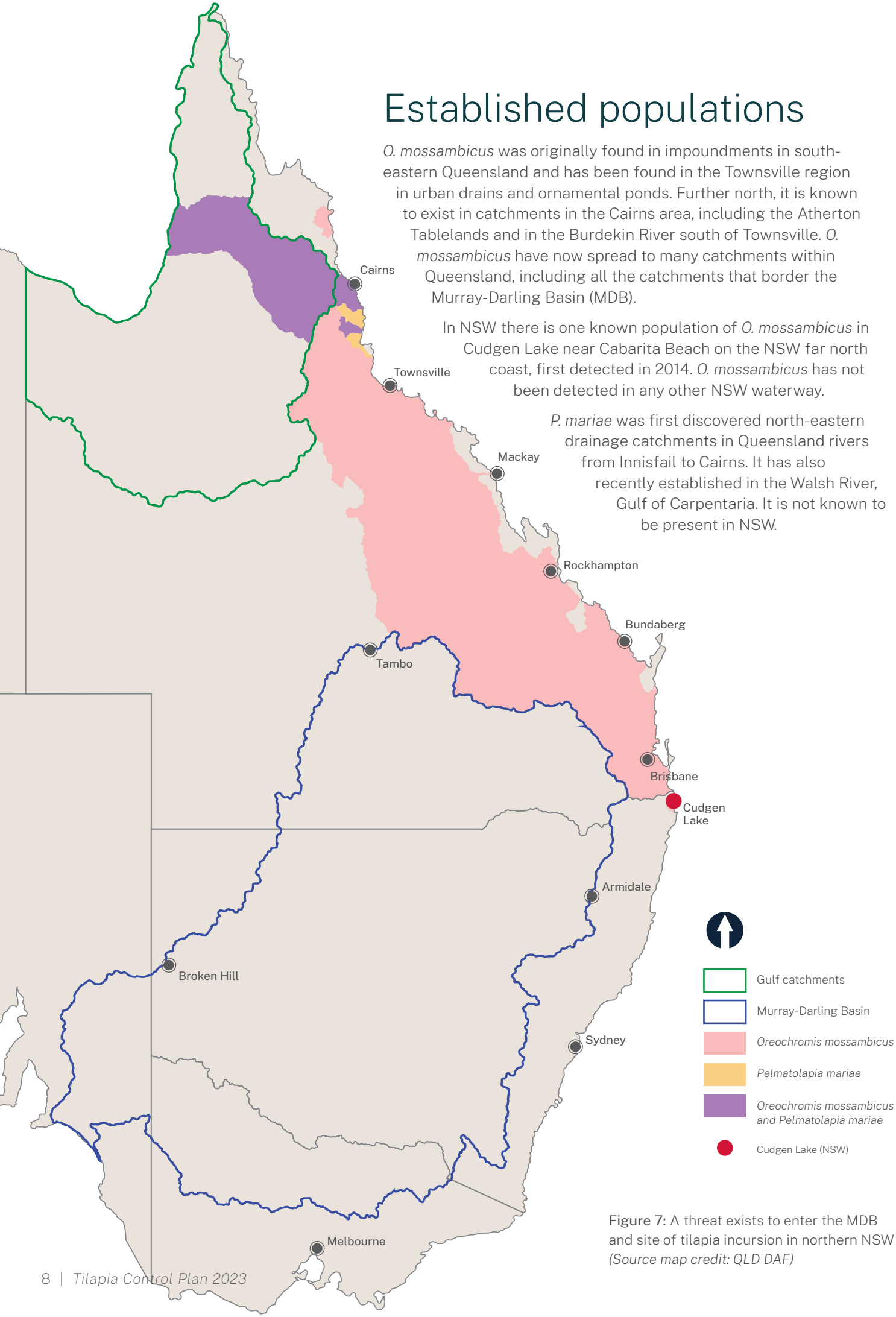


Figure 7: A threat exists to enter the MDB and site of tilapia incursion in northern NSW *(Source map credit: QLD DAF)*

Goals and outcomes

Goals

Goal 1

Contain – prevent spread of the existing NSW population of tilapia

- The close proximity of Cudgen Lake to neighbouring waterways including the Tweed River, Mooball Creek and Brunswick River highlight the need for ongoing surveillance and containment. Preventing the spread of tilapia into the adjacent tributaries of these larger waterways will limit the impacts this species has in NSW.

Goal 2

Exclude – prevent establishment of new tilapia populations in other NSW regions

- Through engaging with the community and increasing awareness of the impacts caused by tilapia, there will be a reduction in human mediated pathways for this pest to enter NSW. An uptake in the reporting of suspected sightings will assist in alleviating any further incursions or spread.
- Collaborating with QLD jurisdictions and NSW border agencies to prevent tilapia entering the Murray-Darling Basin.

Goal 3

Build capacity and capability – ensure NSW has the ability to control and manage tilapia

- Further research and development including advancements in technologies will benefit the surveillance and response capabilities as well as potential eradication or control methods of new and existing incursions. Further knowledge of the impacts of tilapia will provide a clearer focus on potential remediation.

How to achieve these goals

The delivery of this plan will:

- Facilitate management by providing an overarching adaptive management framework.
- Identify priorities to support each of the three goals and the expected outcomes.
- Identify stakeholders who are key in managing the threat of tilapia.

Roles and responsibilities

Government agencies

National level

- **Department of Agriculture, Fisheries and Forestry (DAFF)**
  Nationally, DAFF is the lead agency for biosecurity planning.

State level

- **NSW Department of Primary Industries (NSW DPI)**
  In NSW, the Department of Primary Industries is the lead agency for invasive species policy and management of new incursions and established invasive freshwater fish species, including tilapia. NSW DPI participates in national committees including the Environment and Invasives Committee (EIC) and is a member of the committee's sub-group, the Freshwater Vertebrate and Invertebrate Working Group (FVIWG). NSW DPI also chairs a NSW Ornamental Fish Reference Group, that helps to facilitate pest fish communication activities in NSW.
- **Local Land Services (LLS)**
  LLS is the interface between landholders and government across invasive species management. LLS builds the capacity of local stakeholder groups to undertake pest animal management, including education, and provides operational assistance during invasive species incursions and surveillance operations.

Other stakeholders

- **Murray-Darling Basin Authority (MDBA) and the Centre for Invasive Species Solutions (CISS)**
  Both MDBA and CISS work with state and national authorities in planning and implementing pest fish management and research initiatives.
- **Local Government**
  Local councils can assist with an emergency incursion response in addition to ongoing management activities.
- **Community and other waterway users (inc. recreational fishers)**
  Due to the potential scale of the tilapia problem and the role individual actions play in its spread, it is vital for the community to be aware and informed about tilapia. Community members and waterway users should be involved where appropriate in control programs and have an understanding of the current laws prohibiting release of live fish or use of live bait.
- **Schools**
  Schools participate in education programs to increase student understanding of tilapia, other aquatic pests, and their biosecurity duty.

Governance

NSW legislation

- *Biosecurity Act 2015*
- Biosecurity Regulation 2017
- *Fisheries Management Act 1994*
- Fisheries Management (General) Regulation 2019

The *NSW Biosecurity Act 2015* lists Mozambique tilapia *(O. mossambicus)* as a notifiable species under Schedule 1, Part 2 of the Biosecurity Regulation 2017.

Under Clause 18 of the Biosecurity Regulation 2017, it is illegal to possess or control, buy or sell, move or release this pest in NSW.

Under Clause 19 of the Biosecurity Regulation 2017, this pest, if landed through recreational fishing or other means, must be dispatched immediately and may not be returned to the water.

Other species of tilapias from the genera *Oreochromis, Pelmatolapia, Sarotherodon* and *Coptodon*, are listed as prohibited matter in NSW under Schedule 2 of the *Biosecurity Act 2015*.

Under Clause 216 of the *Fisheries Management Act 1994*, it is illegal to release live fish into a waterway without a permit.

Under Clause 84, Sub Clause 2(a) of the Fisheries Management (General) Regulation, it is illegal to use live finfish as bait in inland waters of NSW.

Summary of goals, priorities and actions

Table 1: Goal 1 – Contain

Goal 1: Contain – prevent spread of the existing NSW population of tilapia		
Outcomes	**Priority**	**Action**
■ **Contain tilapia to Cudgen Lake and tributaries.** ■ **No spread into neighbouring waterways**	**1A: Surveillance** – increase early detection/increase capabilities	**Action 1A.1** Implement NSW 5-year Freshwater Surveillance Plan
		Action 1A.2 Invest in eDNA technology for tilapia detection
	1B: Pathways management – counter deliberate and accidental translocation	**Action 1B.1** Increased enforcement of existing legislation
		Action 1B.2 Raise education and awareness of pathways for spread (in conjunction with Priority 2A)

Table 2: Goal 2 – Exclude

Goal 2: Exclude – prevent establishment of new tilapia populations in other NSW regions		
Outcomes	**Priority**	**Action**
■ No new incursions in NSW, particularly the Murray-Darling Basin. ■ An increase in knowledge within the community. ■ A reduction in human-mediated spread and an increase in awareness to report suspicious sightings.	2A: Improve community awareness through effective engagement, communication, education and training	**Action 2A.1** Implement train the trainer programs in high-risk areas to increase awareness and appropriate biosecurity behaviours **Action 2A.2** Develop content for school education programs in collaboration with Fisheries Education **Action 2A.3** Develop and conduct a community awareness campaign on the importance of stopping the spread
	2B: Social research into the behavioural drivers for human-mediated spread of tilapia	**Action 2B.1** Gauge community understanding of environmental and ecological impacts. Determine reasons for potential illegal behaviours, including assessing what value is placed on keeping and spreading tilapia
	2C: Collaborate with QLD jurisdictions and NSW agencies (in conjunction with Priority 3B)	**Action 2C.1** Support collaboration with QLD and NSW agencies to prevent an incursion into NSW via the Murray-Darling Basin

Table 3: Goal 3 – Build capacity and capability

Goal 3: Build capacity and capability – ensure NSW has the ability to control and manage tilapia		
Outcomes	**Priority**	**Action**
■ Increase surveillance and response capabilities. ■ Identify potential eradication or control methods for new and existing incursions. ■ Identify further areas of impact that could be remedied.	3A: Support research into effective control mechanisms	**Action 3A.1** Support CISS biocontrol research activities **Action 3A.2** Support development of national research programs to explore innovative control technologies for pest fish & tilapia (incl. via FVIWG, EIC and CISS)
	3B: Inter-agency collaboration	**Action 3B.1** Support collaboration between NSW DPI agencies, LLS, MDBA and Local Councils in implementing response procedures and community education activities. **Action 3B.2** Support environmental restoration or native fish recovery in areas impacted by tilapia.

Appendix A

Risk Assessment

A risk analysis was undertaken to provide an evidence base to inform the recommended management approach to reduce the risk of tilapia being translocated and establishing in a new waterway in NSW, in particular the Murray-Darling Basin (MDB).

As a result of the risk analysis, it is considered that the:

- Likelihood of tilapia entering and establishing in a new NSW waterway, including the MDB, is POSSIBLE,
- Overall consequence has been assessed as MODERATE, and therefore,
- Overall risk of tilapia entering and establishing in a new waterway without mitigations is MEDIUM.

However, it is important to note the overall environmental risk of this species establishing in the MDB is HIGH. This is above the NSW acceptable level of risk, and therefore risk mitigation strategies need to be implemented.

With current mitigation options in place the:

- Likelihood of tilapia entering and establishing in a new location in NSW is reduced to UNLIKELY,
- Consequence is MODERATE, and therefore,
- Residual risk of tilapia establishing in a new NSW location remains a MEDIUM risk, and
- Environmental risk is HIGH.

The risk remains above the NSW acceptable level of risk and therefore new risk mitigation strategies need to be developed.

The outcome of the risk assessment was a recommendation that NSW DPI develop a Freshwater Fish Incursion Response Procedure and a Tilapia Control Plan (this plan) in consultation with both internal and external stakeholders.

This Control Plan is adaptive. As new information becomes available it will be incorporated into the risk assessment and the results will be used to refine the management response as necessary.

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