



Department of
Primary Industries

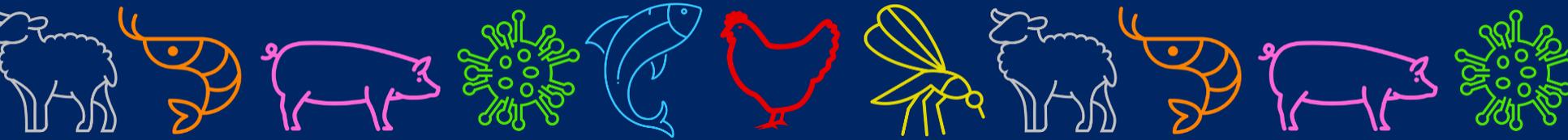
NSW Tilapia Control Plan 2023: Minimising the risk of tilapia to NSW

Ian Boutell & Gayle Garbutt

AQUATIC BIOSECURITY RISK MANAGEMENT PROGRAM

*Animal Biosecurity Branch | Biosecurity & Food Safety Division
NSW Department of Primary Industries*

NSW Vertebrate Pest Management Symposium | 17 October 2023



What is tilapia?



Mozambique Mouthbrooder / Tilapia
Oreochromis mossambicus



Spotted Tilapia
Pelmatolapia mariae

Photos: Gunter Schmida

The tilapia threat

Top 100 worst invasive species in the world (IUCN)

Factors for successful invasion

- 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



The tilapia threat

Top 100 worst invasive species in the world (IUCN)

Impacts

- Economic
 - QLD up to \$13.6M p.a¹
- Damage to aquatic environment through habitat alteration
- 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.



Photo: QLD DAF

¹ Sunarto et al., 2022

Established Populations



Gulf Catchments



Murray-Darling Basin



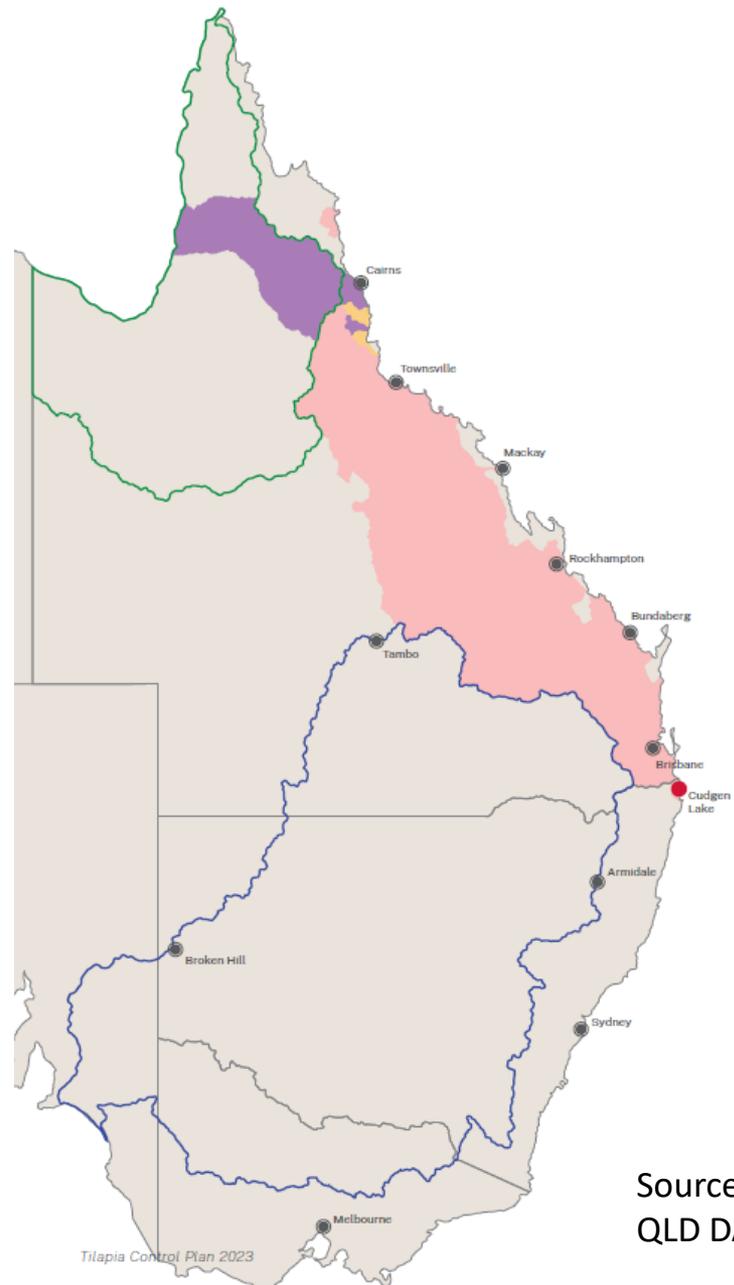
Oreochromis mossambicus



Pelmatolapia mariae



O. mossambicus & *P. mariae*



Source map credit:
QLD DAF

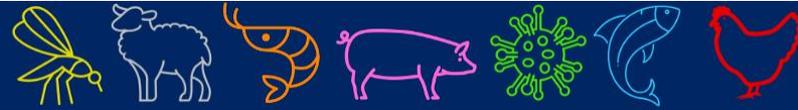


Established populations



Tilapia Control Plan 2023

NSW free from the spread and further threat of tilapia





Goal 1

Contain – prevent spread of the existing NSW population of tilapia



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Goal 2

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



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Goal 3

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



Tilapia Control Plan



Goal 1: Contain – prevent spread of the existing NSW population of tilapia

Outcomes	Priority	Action
<ul style="list-style-type: none">■ Contain tilapia to Cudgen Lake and tributaries.		

Photos: QLD DAF



Tilapia Control Plan



Goal 1: Contain – prevent spread of the existing NSW population of tilapia

Outcomes

Priority

Action

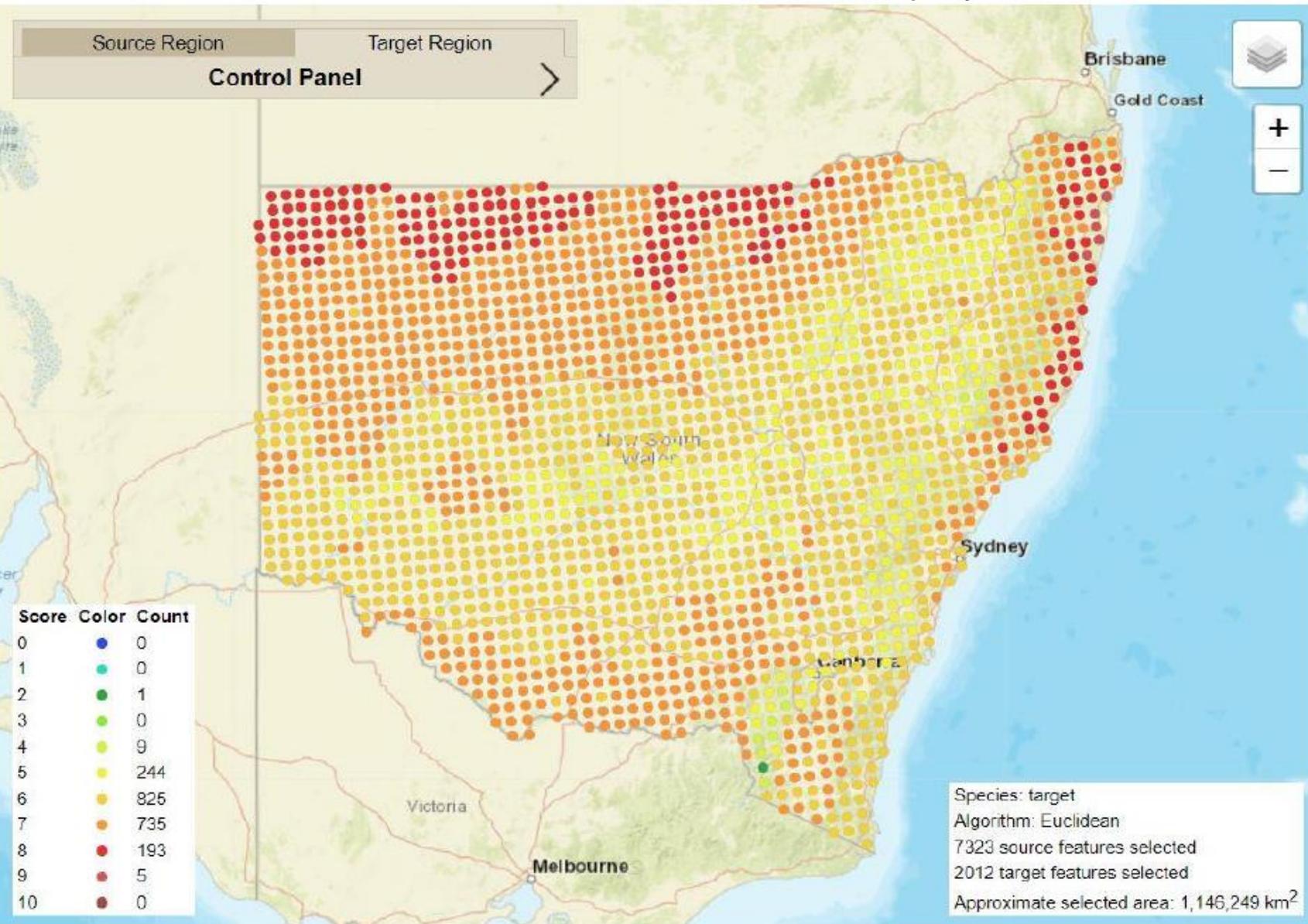
- Contain tilapia to Cudgen Lake and tributaries.

1A: Surveillance – increase early detection/increase capabilities

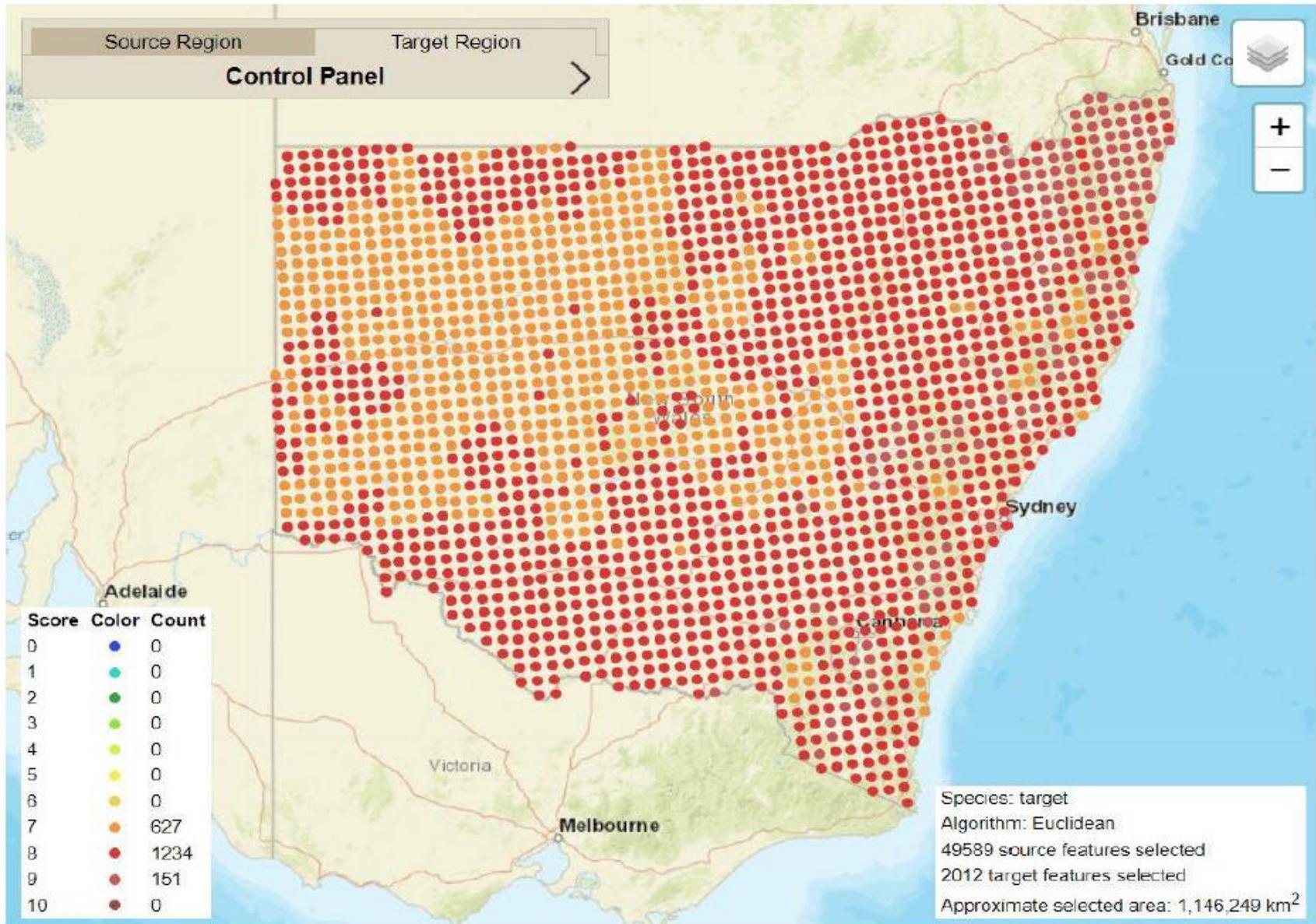
Action 1A.1

Implement NSW 5-year Freshwater Surveillance Plan

Photos: QLD DAF



Source: Cardno (NSW/ACT) Pty Ltd



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Tilapia Control Plan



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Outcomes	Priority	Action
<ul style="list-style-type: none">Contain tilapia to Cudgen Lake and tributaries.	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

Photos: QLD DAF

Environmental DNA (eDNA) water sampling



Self preserving eDNA filter.
(Photo: enviroDNA)



Ian Boutell sampling.
(Photo: Luke Barron)



Tilapia Control Plan



Goal 1: Contain – prevent spread of the existing NSW population of tilapia

Outcomes	Priority	Action
<ul style="list-style-type: none">■ 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

Photos: QLD DAF



Tilapia Control Plan



Goal 1: Contain – prevent spread of the existing NSW population of tilapia

Outcomes	Priority	Action
<ul style="list-style-type: none">■ Contain tilapia to Cudgen Lake and tributaries.■ No spread into neighbouring waterways	<p>1A: Surveillance – increase early detection/increase capabilities</p> <hr/> <p>1B: Pathways management –counter deliberate and accidental translocation</p>	<p>Action 1A.1 Implement NSW 5-year Freshwater Surveillance Plan</p> <p>Action 1A.2 Invest in eDNA technology for tilapia detection</p>

Photos: QLD DAF



Tilapia Control Plan



Goal 1: Contain – prevent spread of the existing NSW population of tilapia

Outcomes	Priority	Action
<ul style="list-style-type: none">■ 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)

Photos: QLD DAF

Tilapia Control Plan

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.



Tilapia Control Plan

Goal 2: Exclude – prevent establishment of new tilapia populations in other NSW regions

Outcomes	Priority	Action
<ul style="list-style-type: none">■ No new incursions in NSW, particularly the Murray-Darling Basin.	2A: Improve community awareness through effective engagement, communication, education and training	



Tilapia Control Plan

Goal 2: Exclude – prevent establishment of new tilapia populations in other NSW regions

Outcomes	Priority	Action
<ul style="list-style-type: none">No new incursions in NSW, particularly the Murray-Darling Basin.	2A: Improve community awareness through effective engagement, communication, education and training	<p>Action 2A.1 Implement train the trainer programs in high-risk areas to increase awareness and appropriate biosecurity behaviours</p> <p>Action 2A.2 Develop content for school education programs in collaboration with Fisheries Education</p> <p>Action 2A.3 Develop and conduct a community awareness campaign on the importance of stopping the spread</p>



Tilapia Control Plan

Goal 2: Exclude – prevent establishment of new tilapia populations in other NSW regions

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<ul style="list-style-type: none">■ No new incursions in NSW, particularly the Murray-Darling Basin.■ An increase in knowledge within the community.	<p>2A: Improve community awareness through effective engagement, communication, education and training</p> <hr/> <p>2B: Social research into the behavioural drivers for human-mediated spread of tilapia</p>	<p>Action 2A.1 Implement train the trainer programs in high-risk areas to increase awareness and appropriate biosecurity behaviours</p> <p>Action 2A.2 Develop content for school education programs in collaboration with Fisheries Education</p> <p>Action 2A.3 Develop and conduct a community awareness campaign on the importance of stopping the spread</p>



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	<p>2B: Social research into the behavioural drivers for human-mediated spread of tilapia</p>	<p>Action 2B.1 Gauge community understanding of environmental and ecological impacts.</p> <p>Determine reasons for potential illegal behaviours, including assessing what value is placed on keeping and spreading tilapia</p>



Tilapia Control Plan

Goal 2: Exclude – prevent establishment of new tilapia populations in other NSW regions

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<ul style="list-style-type: none"> ■ 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	<p>Action 2A.1 Implement train the trainer programs in high-risk areas to increase awareness and appropriate biosecurity behaviours</p> <p>Action 2A.2 Develop content for school education programs in collaboration with Fisheries Education</p> <p>Action 2A.3 Develop and conduct a community awareness campaign on the importance of stopping the spread</p>
	2B: Social research into the behavioural drivers for human-mediated spread of tilapia	<p>Action 2B.1 Gauge community understanding of environmental and ecological impacts.</p> <p>Determine reasons for potential illegal behaviours, including assessing what value is placed on keeping and spreading tilapia</p>
	2C: Collaborate with QLD jurisdictions and NSW agencies (in conjunction with Priority 3B)	



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	2B: Social research into the behavioural drivers for human-mediated spread of tilapia	<p>Action 2B.1 Gauge community understanding of environmental and ecological impacts.</p> <p>Determine reasons for potential illegal behaviours, including assessing what value is placed on keeping and spreading tilapia</p>
	2C: Collaborate with QLD jurisdictions and NSW agencies (in conjunction with Priority 3B)	<p>Action 2C.1 Support collaboration with QLD and NSW agencies to prevent an incursion into NSW via the Murray-Darling Basin</p>



Tilapia Control Plan

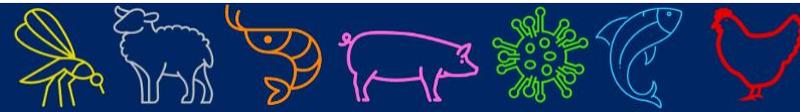
Goal 3: Build capacity and capability – ensure NSW has the ability to control and manage tilapia

Outcomes

Priority

Action

- Increase surveillance and response capabilities.



Tilapia Control Plan

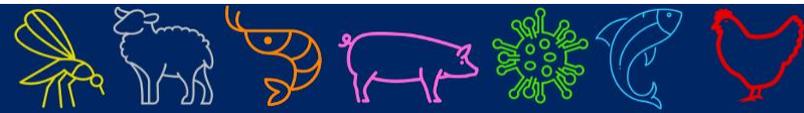
Goal 3: Build capacity and capability – ensure NSW has the ability to control and manage tilapia

Outcomes

Priority

Action

- Increase surveillance and response capabilities.
- Identify potential eradication or control methods for new and existing incursions.



Tilapia Control Plan

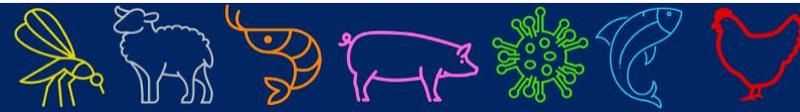
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Outcomes

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.



Tilapia Control Plan

Goal 3: Build capacity and capability – ensure NSW has the ability to control and manage tilapia

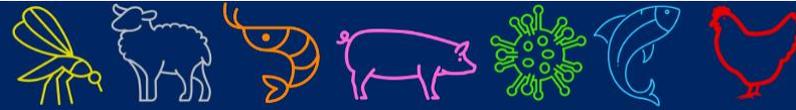
Outcomes

- 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.

Priority

3A: Support research into effective control mechanisms

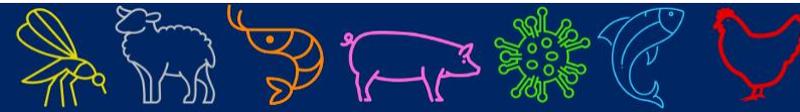
Action



Tilapia Control Plan

Goal 3: Build capacity and capability – ensure NSW has the ability to control and manage tilapia

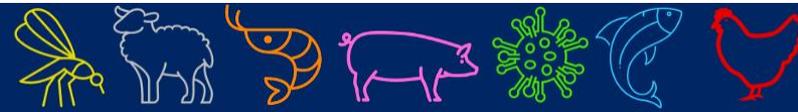
Outcomes	Priority	Action
<ul style="list-style-type: none">■ Increase surveillance and response capabilities.■ Identify potential eradication or control methods for new and existing incursions.■ Identify further areas of impact that could be remedied.	3A: Support research into effective control mechanisms	<p>Action 3A.1 Support CISS biocontrol research activities</p> <p>Action 3A.2 Support development of national research programs to explore innovative control technologies for pest fish & tilapia (incl. via FVIWG, EIC and CISS)</p> <hr/>



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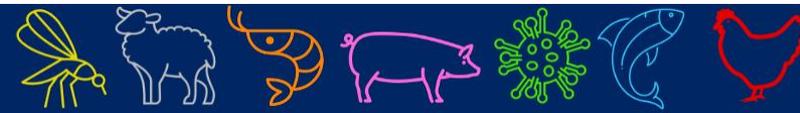
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Outcomes	Priority	Action
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	3B: Inter-agency collaboration	<p>Action 3B.1 Support collaboration between NSW DPI agencies, LLS, MDBA and Local Councils in implementing response procedures and community education activities.</p> <p>Action 3B.2 Support environmental restoration or native fish recovery in areas impacted by tilapia.</p>



Acknowledgements

We thank current and previous NSW DPI Aquatic Biosecurity team members who contributed significantly to the development of the NSW Tilapia Control Plan through background research, reviewing and feedback.

In particular we thank Debra Doolan, Kirk Dahle, Vic Greentree, Helen Cribb and Emma McGrath who all made significant contributions in the early stages.

We also thank those who provided feedback through the draft plan consultation process.

1. Sunarto, A., Grimm, J., McColl, K.A., Ariel, E., Nair, K.K., Corbeil, S., Hardaker, T., Tizard, M., Strive, T., Holmes, B. (2022) Bioprospecting for biological control agents for invasive tilapia in Australia. *Biological Control* 174, 105020.



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