

# Action statement

*Flora & Fauna Guarantee Act 1988*

## Trout Cod (*Maccullochella macquariensis*)

Taxon ID: 4868

Action statements are developed under the Flora and Fauna Guarantee Act 1988 (FFG Act). Their preparation and implementation complement the FFG Act strategy Protecting Victoria's Environment – Biodiversity 2037 and its vision that "Victoria's biodiversity is healthy, valued and actively cared for".

### Species and Distribution



Trout Cod. Image by Dave Dawson.



This habitat distribution model displays the indicative range of the Trout Cod based on occurrence records and likely habitat. See [NatureKit](#) for an interactive map. The Trout Cod also occurs outside of Victoria.

### Conservation Status

#### Endangered

**Listing criteria:** 4.1.2(a),(b)(i,ii,iii,iv,v) of the Flora and Fauna Guarantee Regulations 2020.

This means that:

- The Trout Cod's geographic distribution is highly restricted; and
- the distribution of the population or habitat of the taxon is severely fragmented; and
- there is a continuing decline or reduction in:
  - its extent of occurrence; and
  - its area of occupancy; and
  - the area, extent or quality of habitat; and
  - the number of locations or subpopulations; and
  - the number of mature individuals.

**Corresponding International Union for the Conservation of Nature (IUCN) criteria:** B2ab(i,ii,iii,iv,v).

More information on IUCN listing criteria can be found here: [IUCN Red List criteria](#).

## Species Information

Species information such as its description, distribution, ecology and references are provided in the [Trout Cod Species Forecast Report](#).

## Threats

Threats listed below have been identified through consultation, published literature and spatial analysis.

Threat	Description
<b>Habitat loss, degradation or modification</b>	
Barriers to movement	<ul style="list-style-type: none"> <li>Physical barriers to movement reduce the Trout Cod's access to habitat, opportunity for dispersal from source populations, and genetic exchange between populations.</li> </ul>
Forestry operations	<ul style="list-style-type: none"> <li>Forestry operations have the potential to contribute to erosion and cause sedimentation in Trout Cod habitat, which may cause mortality of individuals.</li> </ul>
Livestock	<ul style="list-style-type: none"> <li>Livestock grazing in riparian zones can cause habitat degradation through erosion, sedimentation, and excess nutrient loads.</li> </ul>
Vegetation clearing or damage	<ul style="list-style-type: none"> <li>Removal or damage to vegetation contributes to habitat degradation through erosion and sedimentation, and loss of instream woody debris.</li> </ul>
<b>Population dynamics</b>	
Population fragmentation	<ul style="list-style-type: none"> <li>Fragmentation of once connected populations into smaller, isolated populations increases the risk of genetic decline and associated changes to recruitment and/or mortality rates.</li> </ul>
Small population size	<ul style="list-style-type: none"> <li>Small populations have lower resilience to the risk of stochastic events, and increased risk of genetic decline.</li> </ul>
<b>Human disturbance</b>	
Construction, development and/or infrastructure	<ul style="list-style-type: none"> <li>Construction and development may result in direct removal of habitat (i.e., large woody debris), or indirect impacts to habitat through changes to the flow regime.</li> <li>Mortality of Trout Cod larvae can occur when passing into irrigation channels, particularly when interacting with pumps and weirs.</li> </ul>
Recreational fisheries	<ul style="list-style-type: none"> <li>Incidental mortality and/or disturbance can occur through recreational fishing practices (by-catch and/or through collision or entanglement).</li> <li>Illegal take of this protected species also occurs.</li> <li>The difficulty in distinguishing Trout Cod from Murray Cod (<i>Maccullochella peelii</i>) may lead to anglers mistakenly take Trout Cod.</li> </ul>
<b>Introduced species</b>	
Introduced fish	<ul style="list-style-type: none"> <li>Introduced fish species (particularly European Carp (<i>Cyprinus carpio</i>) and Redfin Perch (<i>Perca fluviatilis</i>)) impact water quality and aquatic vegetation, degrading habitat for native species including the Trout Cod.</li> </ul>

Threat	Description
Introduced plants	<ul style="list-style-type: none"> <li>Introduced plants (e.g., willows (<i>Salix</i> spp.)) change the structure and composition of native habitats, resulting in changes to habitat extent and/or condition. Weeds such as willows can smother and/or degrade the available habitat for fish.</li> </ul>
<b>Altered hydrology</b>	
Altered water regime	<ul style="list-style-type: none"> <li>Flow regimes which do not align with the Trout Cod's needs may impact habitat suitability, growth, recruitment and/or mortality, dispersal and ultimately area of occupancy.</li> </ul>
<b>Water properties</b>	
Degraded water quality	<ul style="list-style-type: none"> <li>Poor water quality such as increased turbidity, high nutrient concentrations, and/or low dissolved oxygen concentrations (e.g., through blackwater events) impacts habitat quality, breeding potential and can lead to mortality.</li> </ul>
Water temperature changes	<ul style="list-style-type: none"> <li>Sudden or sustained changes in water temperature (particularly cold-water pollution) may impact behaviour, spawning cues, and cause mortality to temperature-sensitive species.</li> </ul>
<b>Climate change</b>	
Extreme weather events	<ul style="list-style-type: none"> <li>Climate change may increase the frequency and intensity of storms and flooding, increasing erosion and impacting habitat condition, and potentially causing mortality events.</li> </ul>
Increased frequency and/or length of droughts	<ul style="list-style-type: none"> <li>Drying and warming of the environment, including droughts, will impact flow regimes and may lead to habitat changes, and impact recruitment and/or mortality rates.</li> </ul>
<b>Fire</b>	
Altered fire regime	<ul style="list-style-type: none"> <li>A hotter, drier climate may increase the likelihood or frequency of fire impacting habitat, with the potential to reduce habitat extent and/or condition.</li> <li>Bushfires can result in habitat degradation and mortality through sedimentation (e.g., through post fire rain events).</li> </ul>

## Conservation Objectives

Conservation objectives are informed by the conservation status and criteria under which the species was listed under the FFG Act. This provides a framework to understand how we can work towards recovery and improve the species' conservation status over time as per the objectives of the FFG Act.

The key objectives of this action statement are:

- Mitigate threats to populations and habitat to increase resilience, improve genetic fitness and minimise future population decline.
- Increase the Trout Cod's range and/or extent, by providing opportunities for natural movement and translocation where dispersal potential is limited.
- Establish at least three new viable populations within its historic range.
- Increase knowledge of biology, ecology, distribution, demography, emerging threats, and conservation requirements.

- Support community participation and improve awareness of the Trout Cod and conservation of its habitat.

## Conservation Actions

The actions below have been identified through expert consultation, published literature and spatial analysis. Actions are listed in alphabetical order to allow all interested parties to prioritise based on their context, capacity and capability. Landscape scale actions may mitigate threats for other species. For more information on where to undertake actions that benefit multiple species and identify the most beneficial locations to undertake actions for this species, please refer to [NatureKit](#).

Action	Description
Community engagement and awareness	<ul style="list-style-type: none"> <li>• Continue to raise landholder awareness of Trout Cod presence and ecological needs, and the impacts of livestock grazing in riparian zones to the species and its habitat. Provide guidance on the changes to grazing that may be required, such as excluding livestock from riparian zones, to support the recovery of the species.</li> <li>• Continue to identify, promote and support opportunities for community involvement in conservation efforts.</li> <li>• Continue to raise landholder and broader community awareness of the importance of protecting habitat and managing threats.</li> </ul>
Compliance and enforcement	<ul style="list-style-type: none"> <li>• Undertake risk-based compliance and enforcement activities to limit illegal take of the Trout Cod.</li> </ul>
Control introduced fish	<ul style="list-style-type: none"> <li>• Implement and maintain effective control of introduced fish (particularly European Carp and Redfin Perch) in priority areas.</li> </ul>
Control introduced plants *	<ul style="list-style-type: none"> <li>• Implement and maintain effective control of introduced plants (particularly Willows) in priority areas and undertake revegetation with appropriate native species.</li> </ul>
Develop, update and apply forestry protections	<ul style="list-style-type: none"> <li>• Maintain prescriptions for this species under the <i>Code of Practice for Timber Production 2014 (as amended in 2022)</i> (the Code).</li> <li>• Where relevant, incorporate species-specific protection measures into plans and permits relating to timber harvesting operations in native forest on private land.</li> <li>• Incorporate measures to protect relevant environmental values into timber harvesting plans for plantations.</li> </ul>
Ex-situ management	<ul style="list-style-type: none"> <li>• Establish and maintain ex-situ broodstock (with appropriate genetic management practices) in suitable secure sites, to service the conservation objectives of the species.</li> </ul>
Identify and protect refuges	<ul style="list-style-type: none"> <li>• Identify and protect habitat areas that provide important refugia from disturbance events (e.g., fire) or significant weather events (e.g., drought). Actions include environmental woody weed control in key refugia/systems.</li> </ul>
Manage barriers to movement	<ul style="list-style-type: none"> <li>• Consider the Trout Cod's needs and distribution in decision making around the establishment of new potential barriers to movement. Consider opportunities to overcome the impacts of existing barriers to movement.</li> </ul>

Action	Description
Manage built infrastructure	<ul style="list-style-type: none"> <li>Consider the Trout Cod's requirements in the placement and design of built infrastructure near key habitat (including irrigation channel design of pumps and weirs). Include planning for appropriate buffers to limit off-site impacts of infrastructure.</li> </ul>
Manage environmental water	<ul style="list-style-type: none"> <li>Manage water regimes and water quality (including water temperature) to support retention, restoration and/or creation of habitat and/or population persistence and to meet the ecological needs (e.g., life history requirements) of the species.</li> </ul>
Manage impacts from natural disaster events	<ul style="list-style-type: none"> <li>Identify and implement recovery actions for vulnerable populations impacted by natural disaster events (e.g., significant fire or flood events). Undertake salvage translocation by removing a proportion of individuals to maintain in captivity in aquaculture facilities or natural refuges (appropriate farm dams) until the risk abates and fish can be returned or translocated.</li> </ul>
Minimise and mitigate the impacts of pollution	<ul style="list-style-type: none"> <li>Minimise or mitigate the impacts of pollution by identifying and implementing available management options to address the source, transfer pathways, and impact of pollutants to the Trout Cod.</li> </ul>
Research	<ul style="list-style-type: none"> <li>Increase understanding of genetic risks and management options. Include modelling to predict impact of broodstock collection on remnant populations.</li> <li>Improve understanding of, and develop guidelines/priorities for, habitat restoration and management approaches (e.g., stocking or translocations).</li> <li>Improve understanding of reproductive requirements and factors influencing recruitment success (including impacts from introduced fish). Also quantify links between river flows, survival and recruitment dynamics to guide flow management.</li> <li>Investigate the impacts of known threats and potential management actions, including research to understand the impact of unintentional hooking mortality and how to reduce misidentification of the species with Murray Cod.</li> </ul>
Restoration and/or revegetation*	<ul style="list-style-type: none"> <li>Undertake restoration and/or revegetation to increase habitat suitability and/or create new habitat areas, including introduction of large woody debris into the riverine environment.</li> </ul>
Survey and monitoring	<ul style="list-style-type: none"> <li>Monitor populations at known sites and other suitable locations to assess distribution, population trends and habitat condition.</li> <li>Undertake targeted field surveys to confirm the extent of all known populations and seek to discover previously undetected populations based on predicted habitat and ecological information.</li> </ul>
Translocation	<ul style="list-style-type: none"> <li>Design and implement a translocation program to meet the objectives of the action statement and ensure prioritised waterways are within the species historical range.</li> </ul>

\*Indicates landscape-scale actions that may deliver benefits to multiple species

## Past Actions

The key conservation management actions listed below have been delivered in the past 10 years.

Past action	Description
Develop, update and apply forestry protections	<ul style="list-style-type: none"><li>The risk of forestry operations was considered for this species in 2020 under the Victorian Government Threatened Species and Communities Risk Assessment. Additional permanent protections were not found to be required.</li><li>The species has a current species-specific prescription in the Code:<ul style="list-style-type: none"><li>In the North East and Mid-Murray Forest Management Areas: Conduct a site inspection and detailed planning in consultation with the Department to ensure the species is adequately managed and protected when timber harvesting operations are planned in rivers and catchments upstream of viable Trout Cod populations.</li></ul></li></ul>
Ex-situ management	<ul style="list-style-type: none"><li>There is currently a captive breeding program for the species at Snobs Creek Hatchery. Broodstock are held in the hatchery.</li></ul>
Restoration and/or revegetation	<ul style="list-style-type: none"><li>Habitat restoration, primarily re-snagging (introduction of large woody debris) and riparian restoration, is being undertaken along key sections of the Ovens River, Goulburn River and Sevens Creeks.</li></ul>
Survey and monitoring	<ul style="list-style-type: none"><li>Annual monitoring has occurred at Sevens Creeks, Goulburn and the Ovens River systems and associated streams (i.e., King, Buffalo, Dandongadale and Rose Rivers).</li></ul>
Translocation	<ul style="list-style-type: none"><li>Stocking has occurred at the Goulburn River on sections between Molesworth and Seymour, Cudgewa Creek and Kerferd and Sambell Lake (Beechworth).</li></ul>

## Decision Support Tools

Decision making for conservation actions is supported through the following Victorian Government tools which may be of assistance in choosing the most appropriate or beneficial actions for biodiversity:

- [Choosing actions for nature: NatureKit](#)
- [Biodiversity Knowledge Framework](#)

## Further Information

- [Trout Cod Species Forecast Report](#)
- [Threatened Species Assessment report – Trout Cod \(\*Maccullochella macquariensis\*\)](#)
- [Commonwealth Species Profile and Threats database](#)
- [Code of Practice for Timber Production 2014](#)
- [Victoria's changing climate – understanding the impacts of climate change in Victoria](#)
- [Genetic Risk Index](#)
- [Flora and Fauna Guarantee Regulations 2020](#)
- [IUCN Red List criteria descriptions](#)



## Get Involved and Take Action

If you are interested in supporting this species' recovery, there are some important things you need to consider.

The Department of Energy, Environment and Climate Action (DEECA) is committed to engaging and partnering with Traditional Owners on how they wish to be involved in the planning and implementation of actions for this species. Steps must be taken to avoid harm and where appropriate ensure actions can deliver cultural benefits.

You can find advice about required approvals, land manager and/or owner permissions, options and incentives for private land conservation, and engagement with Traditional Owners and public land managers here: [Action statements \(environment.vic.gov.au\)](https://environment.vic.gov.au/action-statements)

To identify the relevant Traditional Owners, use the [Aboriginal Cultural Heritage Register and Information System \(ACHRIS\) Welcome to Country and Acknowledgements Map](#).

You can also register your interest in taking action so we can connect you to other people or organisations working to help us secure the future for this species at [threatened.species@deeca.vic.gov.au](mailto:threatened.species@deeca.vic.gov.au)

## Reporting Actions

Activity data is critical to monitoring the implementation and progress of actions and evaluating action statements. These data are also used to:

- Determine progress towards achieving the contributing targets for [Protecting Victoria's Environment – Biodiversity 2037](#).
- Inform the five-yearly State of the Environment Report.

For guidance on reporting actions undertaken on this species, refer to [Activity Data](#).

## Submitting Monitoring Data

The Victorian Biodiversity Atlas (VBA) provides a foundational dataset showing where biodiversity occurs across the Victorian landscape and how it may have changed over time. As a core input for decision support tools that inform conservation action, public land management, research activities and reporting, we encourage all participants in the delivery of on-ground actions to submit species records and observations, including for introduced plants and animals, as they carry out their projects.

For further information see: [Victorian Biodiversity Atlas \(environment.vic.gov.au\)](https://vba.biodiversity.vic.gov.au/)

Sign up and begin submitting your data today at: <https://vba.biodiversity.vic.gov.au/>

### Acknowledgment

We acknowledge and respect Victorian Traditional Owners as the original custodians of Victoria's land and waters, their unique ability to care for Country and deep spiritual connection to it. We honour Elders past and present whose knowledge and wisdom has ensured the continuation of culture and traditional practices.

We are committed to genuinely partner, and meaningfully engage, with Victoria's Traditional Owners and Aboriginal communities to support the protection of Country, the maintenance of spiritual and cultural practices and their broader aspirations in the 21st century and beyond.



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