Action statement

Flora & Fauna Guarantee Act 1988

Barred Galaxias *(Galaxias fuscus)*

Taxon ID: 4695

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

Barred Galaxias. Image by Tarmo A. Raadik.

This habitat distribution model displays the indicative range of the Barred Galaxias based on occurrence records and likely habitat. See NatureKit for an interactive map.

Conservation Status

Critically Endangered

Listing criteria: 3.1.1 of the Flora and Fauna Guarantee Regulations 2020.

This means that:

- The Barred Galaxias has undergone, is suspected to have undergone, or is likely to undergo in the immediate future, a very severe reduction in population size.

Corresponding International Union for the Conservation of Nature (IUCN) criteria: A2abce+3bce+4abce.

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 Barred Galaxias Species Forecast Report.

Threats

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

Threat	Description
Introduced species	
Deer	• Introduced deer species (Sambar deer (*Cervus unicolor*), Red Deer (*Cervus elaphus*) and Fallow Deer (*Dama dama*)) can degrade water quality and habitat through herbivory, antler-rubbing, trampling, pugging of wet soils, increasing nutrient loads and erosion of waterway edges.
Introduced fish	• Introduced fish can degrade habitat, impact water quality, disrupt ecosystem function, and/or impact directly on individuals through predation and competition for resources with potential to lead to loss or fragmentation of populations. • Predation by, and to a lesser extent competition with, introduced trout is a major threat to Barred Galaxias. Incursion of introduced trout into the habitat of this species is known to cause the reduction in distribution and abundance of Barred Galaxias. Further incursion could lead to rapid population decline and local extinctions of the species.
Altered hydrology	
Altered water regime	• Changes to flow or water regimes which do not align with the Barred Galaxias' needs may impact habitat suitability, recruitment and/or mortality, and ultimately site occupancy. • Both surface and groundwater inputs are important to persistence of Barred Galaxias habitat. • Water extraction (e.g., for snowmaking) may affect key biological processes for Barred Galaxias such as spawning or recruitment, particularly during times of drought.
Climate Change	
Altered rainfall and temperature regimes	• Reduced annual rainfall and increased maximum temperatures will reduce the availability of groundwater outflow and therefore surface water flow, refuge habitat, and affect spawning cues.
Extreme weather events	• Climate change may increase the frequency and intensity of storms and flooding, increasing erosion and sedimentation, impacting flow regimes and habitat condition, and potentially causing mortality events. • An increased frequency and intensity of flooding could drown out instream barriers, potentially facilitating introduced fish incursion.
Increased frequency and/or length of droughts	• Drying and warming of the environment, including droughts, will impact on flow regimes which may to lead to a reduction in habitat, and impact recruitment and/or mortality rates.
Fire	
Altered fire regimes	• Frequent or intense fire and resultant loss of vegetation in the catchment and riparian zone can increase sediment inflows which can smother fish, eliminate instream habitat such as pools and gaps between rocks, impact macroinvertebrate food availability and change water chemistry and temperature, degrading habitat and leading to mortality.

Threat	Description
	• Post-fire debris flows may also create new barriers to movement. • A hotter, drier climate may increase the likelihood or frequency of fire impacting habitat, with the potential to reduce habitat extent and/or condition and lead to loss of local populations.
Emergency response	• Some emergency response activities (e.g., vegetation clearance and/or earthworks) can inadvertently lead to alterations in habitat, vegetation structure, flows or erosion, and mortality of individuals. • Fire retardant can release chemicals into Barred Galaxias habitat which may be toxic to the species.
Fire management activities	• Fire management operations such as creation of fuel breaks (soil disturbance, slashing) may remove habitat and cause mortality of individuals. • Barred Galaxias is vulnerable to sediment inputs from roads or tracks and mechanical disturbance from heavy machinery.
Habitat loss, degradation or modification	
Degradation of riparian and/or wetland vegetation	• Degradation of vegetation in riparian and wetland habitats reduces habitat extent and/or condition, potentially impacting species persistence. • Removal of riparian vegetation can alter water temperatures, contribute to soil erosion, stream bank damage and siltation of streams, causing damage to Barred Galaxias habitat and potentially reducing food availability, refuge and spawning habitat. • As a result of the small, fragmented distribution of the Barred Galaxias, local habitat modifications and degradation could threaten populations.
Forestry operations	• Timber harvesting operations in native forest can contribute to erosion, and sedimentation in the species habitat, which may cause mortality of individuals. • Timber harvesting operations in native forest within the species' catchment can alter hydrological regimes causing habitat degradation or loss.
Human disturbance	
Recreational fisheries	• Illegal translocation/stocking of introduced trout into Barred Galaxias habitat has the potential to cause localised extinctions.
Road and track construction or maintenance	• Construction and maintenance of waterway crossings, roads and tracks expose the Barred Galaxias and its habitat to disturbance from run-off, soil erosion, siltation, off-target impacts of herbicide use and weed and pathogen introduction, in the immediate area and downstream. • Construction of new roads and tracks that provide access into previously remote streams can increase the risk of illegal stocking of introduced trout into habitat.
Population dynamics	
Loss of genetic diversity	• Small, greatly reduced, and/or isolated populations are at increased risk of loss of genetic diversity, which leads to a heightened risk of reduced recruitment and/or increased mortality rates. • Genetic diversity within Barred Galaxias populations is low and gene flow is highly constrained between all extant populations, causing inbreeding and potential loss of fitness, adaptability and resilience.

Threat	Description
Population fragmentation	• Fragmentation of once connected populations into smaller, isolated populations increases the risk of genetic decline and associated changes to recruitment and/or mortality rates.
Small population size	• Small populations have lower resilience to the risk of stochastic events, and increased risk of genetic decline.
Pathogens and disease	
Disease	• Threatened species with small populations and/or reduced genetic diversity are more susceptible to disease risk, both from known, and new/emerging diseases. • Metacercarial cysts, the second life stage of parasitic flatworms (flukes), have been reported in the skin and fins of galaxiids. The prevalence of metacercarial cysts in the Barred Galaxias population is unknown and requires further investigation.
Pollutants and toxicants	
Pesticide use	• Pesticides (including chemicals used to control plants, fungi, invertebrates, and vertebrates) can impact recruitment and/or mortality rates, may alter habitat or ecosystem function, and may impact persistence. • Spray drift or off-target damage from pesticide application within or immediately adjacent to habitat for Barred Galaxias may lead to loss of or damage to habitat and impacts to populations.

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.
- Establish at least three new viable populations within its historic range in areas of potentially increased water security (e.g., areas covered by snow seasonally (Buller to Marysville)).
- Increase knowledge of biology, ecology, distribution, demography, emerging threats, and conservation requirements.
- Support community participation and improve awareness of the Barred Galaxias 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
Apply decision support tools for population management	• Apply relevant decision support tools (e.g., Population Viability Analysis, Specific Needs Assessment) to inform population and threat management decisions.
Avoid and/or mitigate impacts associated with fire management	• Ensure that Barred Galaxias distribution data and ecological information is available and considered in fire management activities. • Undertake biodiversity values check prior to fuel management in areas of the species habitat, to confirm treatment suitability and timing.
Community engagement and awareness	• Continue to raise land manager and broader community awareness of the importance of protecting habitat and managing threats. • Continue to identify, promote, and support opportunities for community involvement in conservation efforts and behaviours that support a healthy environment.
Compliance and enforcement	• Undertake risk-based compliance and enforcement activities to limit the impacts of identified threats to the Barred Galaxias including activities such as illegal translocation/stocking of introduced fish.
Conservation management planning	• Review and update, or develop, relevant plans or planning tools to support conservation management of Barred Galaxias.
Control deer *	• Implement and maintain effective control of deer in priority areas including catchments where Barred Galaxias occurs. • Support the implementation of Victoria's Deer Control Strategy.
Control introduced fish	• Implement and maintain effective management and control of introduced predatory fish in priority areas. Prevent any further introductions of introduced trout into catchments where Barred Galaxias occurs, and catchments prioritised for reintroductions.
Develop, update and apply forestry protections	• Maintain prescriptions for the Barred Galaxias under the *Code of Practice for Timber Production 2014 (as amended in 2022)* (the Code). • Where relevant, incorporate species-specific protection measures into plans and permits relating to timber harvesting operations in native forest on private land. • Apply the following additional permanent protections as recommended in the Victorian Government Threatened Species and Communities Risk Assessment (TSCRA): – *Forest zoning amendments* Within the Central Highlands, Gippsland, and North East Regional Forest Agreement Regions, the Secretary will establish Special Management Zones to the catchment of Barred Galaxias with the following conditions where one or more individuals of Barred Galaxias have been verified: > Environments with high soil absorption capacity: ○ Apply 50 m buffers either side of all mapped and unmapped permanent streams and temporary streams upstream and downstream of any Barred Galaxias site to the watershed boundary (on average 1 km but responsive to local topography).

Action	Description
	○ Apply 40 m buffers plus 10 m filter strips to either side of drainage lines upstream and downstream of the value to the watershed boundary (on average 1 km but responsive to local topography). > Environments with low soil absorption capacity: ○ Apply 80 m buffers either side of all mapped and unmapped permanent streams and temporary streams upstream and downstream of any Barred Galaxias site to the watershed boundary (on average 1 km but responsive to local topography). ○ Apply 60 m buffers plus 20 m filter strips to either side of drainage lines upstream and downstream of any Barred Galaxias site to the watershed boundary (on average 1 km but responsive to local topography). > No new road, snig track, in-coupe road, coupe driveway, coupe infrastructure or stream crossing shall be constructed within or through any buffer without an approved exemption from the Secretary.
Ex-situ management	• Establish and maintain ex-situ populations in suitable secure sites, to service the conservation objectives of the Barred Galaxias, if required.
Genetic rescue	• Investigate the need and options for managing risks from stochastic events and improving resilience through enhancing genetic exchange, via physically linking populations with enhanced habitat, translocation, or genetic management in an ex-situ setting.
Identify and protect refuges	• Identify and protect habitat areas that provide important refugia from disturbance events (e.g., fire) or significant weather events (e.g., drought).
Improve habitat connectivity	• Restore habitat and/or provide appropriate engineering solutions to improve connectivity between habitat patches where feasible.
Manage barriers to movement	• Maintain existing instream barriers (natural or artificial) and construct new instream barriers, where appropriate, to prevent incursion of introduced fish predators. • Undertake routine inspection and maintenance of barrier integrity to ensure continued effectiveness. • Consider the Barred Galaxias' needs and distribution in decision making around the establishment of new potential barriers to movement.
Manage environmental water	• Manage water regimes and water quality to support retention, restoration and/or creation of habitat and/or Barred Galaxias population persistence.
Manage impacts from natural disaster events	• Identify and implement recovery actions for vulnerable populations impacted by natural disaster events (e.g., significant wildfire or flood events) such as reconnaissance of priority sites, emergency extractions, translocations, ex-situ management, and the return of fish once conditions improve.
Manage road and track works	• Ensure distribution data are considered in planning road and track works. • Protect habitat from disturbances caused by road, track, bridge and ford construction and maintenance. • Investigate and mitigate sources of sediment from roads and tracks into streams and stream crossings where the Barred Galaxias occurs, including

Action	Description
	stream crossings, to eliminate sources of direct sediment input into the stream drainage.
Protect key habitat	• Identify and protect habitat areas that provide important refugia from disturbance events (e.g., fire) or significant weather events (e.g., drought). • Minimise alterations to groundwater and surface water hydrological regimes upstream or in surrounding landscapes. • Maintain vegetation cover and health along the banks and riparian zones within catchments where Barred Galaxias occurs.
Research	• Investigate the ecological traits of the Barred Galaxias, including life history traits, such as time to maturity, longevity, fecundity, spawning period, and number of young; movement and dispersal patterns of adults and juveniles; diet and habitat preferences; desiccation, low dissolved oxygen, and water temperature tolerance (adults, juveniles, larvae, and eggs); and predator-avoidance behaviour. • Investigate population genetic structure, levels of genetic diversity and minimum viable population size for successful self-sustaining subpopulations. • Investigate techniques for captive maintenance, breeding, on-growing, ex-situ genetic mixing and translocation. • Investigate development of a genetic survey probe for galaxiids to improve efficacy of eDNA sampling. • Identify drought refuges and investigate options to enhance the resilience of the Barred Galaxias' current habitat to climate change and options for providing new habitat that would be suitable for the species under climate change scenarios. • Investigate the susceptibility of endemic diseases on Barred Galaxias (e.g., through targeted or passive surveillance and, if possible, infectivity trials).
Restoration and/or revegetation *	• Undertake restoration and/or revegetation to increase habitat suitability and/or create new habitat areas. • Restore vegetated buffers along the stream drainage network (wet or dry, stream channel to headwater drainage lines), within catchment(s) where the Barred Galaxias occurs.
Survey and monitoring	• 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. • Monitor populations at known sites and other suitable locations to assess distribution, population trends, habitat condition, and the impact of threats to inform management interventions. • Identify potential translocation sites to establish new populations, or sites requiring bolstering with additional individuals.
Translocation	• Undertake conservation translocations to establish new populations, re-establish previous populations, or bolster declining populations if required to meet the objectives of the action statement.

**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
Avoid and/or mitigate impacts associated with fire management	• Biodiversity input to forest planning processes such as Fire Operations Plan(s), Timber Release Plan(s) and District Action Plans(s) that may have an impact on this species.
Community engagement and awareness	• Liaison has occurred with government agencies responsible for management activities in Barred Galaxias catchments with respect to the presence of the species and potentially threatening processes. • Liaison with local government agencies undertaken to ensure that all relevant scientists, land managers, private landowners and organised angling groups using areas above 400 m in altitude in the Upper Goulburn River system are aware of the Barred Galaxias and report any new locality records.
Conservation management planning	• Informal working group with Goulburn Broken Catchment Management Authority, the Department of Energy, Environment and Climate Action (DEECA) aquatic scientists and biodiversity personnel established to oversee on-ground actions.
Control introduced fish	• Introduced trout removal/control has been undertaken at important sites over the past decade following predator incursion detection during annual population monitoring.
Develop, update and apply forestry protections	• The Barred Galaxias has current species-specific protections in the Code: – In the Central Highlands, Gippsland and North East Forest Management Areas: Apply minimum stream buffer and filter strip widths (specified in Table 10 of the Code) 1km upstream of new Barred Galaxias populations or in management areas / Special Management Zones for Barred Galaxias. Minimise stream crossings over waterways in catchments containing Barred Galaxias. – During fire salvage harvesting: > Apply the minimum stream buffer and filter strip widths in Appendix 1 Table 25 of the Code (Salvage harvesting Barred Galaxias minimum buffer and filter strip widths) upstream of Barred Galaxias populations (all soils), replacing Appendix 1 Table 10 of the Code (Minimum widths for buffer (B) and filter strips (F) applicable to waterway classes for specified aquatic and riparian habitat-dependent species). > Retain harvesting slash in filter strips, and aligned parallel to the stream, to slow the flow of water and reduce the potential for sediment to enter the stream or wetland. • The risk of forestry operations was assessed for the Barred Galaxias in 2020 under the Victorian Government TSCRA. Additional permanent protections were recommended and are being implemented.
Genetic rescue	• Based on the results of a population genetic analysis of all Barred Galaxias populations, genetic exchange to improve genetic diversity of populations was undertaken in 2013/14 at six locations.
Manage barriers to movement	• Condition of barriers at important sites assessed annually, and barrier maintenance undertaken where needed.

Past action	Description
Research	• Population-level genetic research (e.g., develop microsatellite markers) undertaken to guide captive breeding, reintroduction/translocation or long-term population management in 2012. • A specific needs assessment was undertaken for the mountain galaxias species complex following the 2019/20 bushfires. • A genomic single nucleotide polymorphism analysis of the mountain galaxias species complex in Victoria was published in 2022. • Investigation into management options to help ensure the persistence of threatened galaxiids is underway.
Restoration and/or revegetation	• Predators (trout) removed from upstream of barrier at a number of important sites in 2014/15 to restore predator-free habitat and to allow Barred Galaxias population expansion downstream.
Survey and monitoring	• Periodic population monitoring undertaken over the past decade to assess fish abundance and size class structure for population 'health' assessment and monitor relative success of previous year's breeding. Visual inspection of current breeding condition and predator (trout) detection in predator-free zone undertaken. • A fish survey of Flea Creek was completed during 2013/14. No fish were detected in the stream but potential to assess site for future translocation of Barred Galaxias identified. • The location and nature of barriers preventing upstream incursion of predators (trout), or potential downstream barriers to modify to prevent predator incursion was determined at key sites in 2014/15. • Monitoring of baseflow at important sites to ensure population not extirpated due to stream drying was undertaken in 2013. • Monitoring for potential for significant ash and/or sediment input undertaken immediately following wildfire at important sites in 2013.
Translocation	• Two new populations of Barred Galaxias established at Koala Creek and Falls Creek/Baldy Creek on Mount Stirling in 2013/2014 by translocation from multiple populations, guided by genetic work.

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

- Barred Galaxias Species Forecast Report
- Threatened Species Assessment report – Barred Galaxias (*Galaxias fuscus*)
- Commonwealth Species Profile and Threats database
- Threatened Species and Communities Risk Assessment

- Victorian Deer Control Strategy
- Victoria's changing climate – understanding the impacts of climate change in Victoria
- Commonwealth Threat Abatement Plans
- Code of Practice for Timber Production 2014
- 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)

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

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)

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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Accessibility

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