**Scope of environmental watering**

[Table 5.2.7](#_bookmark2) describes the potential environmental watering actions in 2022-23, their expected watering effects (that is, the intended physical or biological effects of the watering action) and the longer-term environmental objective(s) they support. Each environmental objective relies on one or more potential environmental watering actions and their associated physical or biological effects.

**Table 5.2.7 Potential environmental watering actions, expected watering effects and associated environmental objectives for Gunbower Creek and Forest**

|  |  |  |
| --- | --- | --- |
| **Potential environmental watering action** | **Expected watering effect(s)** | **Environmental objective(s)** |
| **Gunbower Forest** |
| Gunbower Forest floodplain, floodrunners and wetlands inundation (with variable flow rates during winter/spring 2022)Icon indicating watering planned and/or delivered in partnership with Traditional Owners to support cultural values and uses. | * Continue floodplain watering commenced in June 2022 to inundate river red gums and the flood-dependent and flood-tolerant understorey species for the optimum duration to help recover condition
* Maintain the depth and extent of water in wetlands to support the growth and successful recruitment of wetland vegetation following positive outcomes in 2021-22
* Provide a variety of water depths throughout the forest to provide feeding, foraging and refuge habitat for frogs, turtles and waterbirds, including colonial nesting species and access to breeding habitat for small-bodied native fish
 | Icon indicating an environmental objective in this system benefits fish populations | Icon indicating an environmental objective in this system benefits frog populations. |
| Icon indicating an environmental objective in this system benefits turtle populations. | Icon indicating an environmental objective in this system benefits vegetation |
| Icon indicating an environmental objective in this system benefits waterbird populations. |  |
| Extend natural flooding in Gunbower Forest floodplain, floodrunners and wetlands (with variable flow rates to maintain an appropriate wetted extent during winter/spring 2022)Icon indicating watering planned and/or delivered in partnership with Traditional Owners to support cultural values and uses. | * Extend the duration and, where possible, the extent of natural floodplain and wetland inundation over the optimal growing season for aquatic vegetation
* Maintain the depth and quality of water to provide habitat for small-bodied native fish, including Murray-Darling rainbowfish
* Provide a variety of water depths throughout the forest to provide feeding, foraging and refuge habitat for frogs, turtles and waterbirds, including colonial nesting species
 | Icon indicating an environmental objective in this system benefits fish populations | Icon indicating an environmental objective in this system benefits frog populations. |
| Icon indicating an environmental objective in this system benefits turtle populations. | Icon indicating an environmental objective in this system benefits vegetation |
| Icon indicating an environmental objective in this system benefits waterbird populations. |  |

|  |  |  |
| --- | --- | --- |
| **Potential environmental watering action** | **Expected watering effect(s)** | **Environmental objective(s)** |
| Spring fresh in Yarran Creek (variable flow rates and duration based on water levels in Gunbower Forest and flows in the Murray River and Gunbower Creek)Icon indicating watering planned and/or delivered in partnership with Traditional Owners to support cultural values and uses. | * Connect Gunbower Creek and the Murray River through the Yarran Creek and Shillinglaws regulators to increase flowing habitat for the lateral movement of native fish, turtles, carbon and nutrients
* Provide migration opportunities for native fish
 | Icon indicating an environmental objective in this system benefits fish populations | Icon indicating an environmental objective in this system benefits turtle populations. |
| Icon indicating an environmental objective in this system aims to maintain, increase, or enable carbon and nutrient cycling and connectivity. |  |
| Black Swamp, Reedy Lagoon, Little Gunbower Creek Complex, Little Reedy Wetland Complex (top-up, variable flow rates during spring/ summer as requiredin response to bird breeding or significant vegetation responses)Icon indicating watering planned and/or delivered in partnership with Traditional Owners to support cultural values and uses. | * Maintain adequate water levels in breeding and feeding habitats to allow breeding waterbirds to successfully fledge their chicks
* Maintain adequate water levels in wetlands to extend the growth phase of wetland vegetation triggered by inundation earlier in the season
 | Icon indicating an environmental objective in this system benefits vegetation | Icon indicating an environmental objective in this system benefits waterbird populations. |
| Gunbower Forest floodplain, floodrunners and wetlands inundation (with variable flow rates during autumn/winter/spring 2023)[[1]](#footnote-2)Icon indicating watering planned and/or delivered in partnership with Traditional Owners to support cultural values and uses. | Part A: May-June 2023 | * Provide a second consecutive year of floodplain watering in 2023 to inundate river red gums and the flood-dependent and flood-tolerant understorey species for the optimum duration to help recover condition
* Maintain the depth and extent of water in wetlands to support the growth and successful recruitment of wetland vegetation
* Provide a variety of water depths throughout the forest to provide feeding, foraging and refuge habitat for frogs, turtles and waterbirds, including colonial nesting species and access to breeding habitat for small-bodied native fish
 | Icon indicating an environmental objective in this system benefits fish populations | Icon indicating an environmental objective in this system benefits frog populations. |
| Icon indicating an environmental objective in this system benefits turtle populations. | Icon indicating an environmental objective in this system benefits vegetation |
| Part B: July-November 2023 | Icon indicating an environmental objective in this system benefits waterbird populations. |  |
| **Gunbower Creek (targeting Koondrook Weir)** |
| Year-round opportunistic fresh(es) (500 ML/day for one to four weeks, as required) | * Deliver in response to high flow in the Murray River (if conditions allow) to:
* promote the exchange of carbon between Gunbower Creek and the Murray River
* provide a natural migratory cue for native fish to either:
	+ trigger the migration and spawning of native fish in the Murray River (during spring), or
	+ attract native fish (such as golden perch and silver perch) to migrate into or to the upstream reaches of Gunbower Creek (during autumn), maximising the effect of the fishways at Koondrook and Cohuna weirs
 | Icon indicating an environmental objective in this system aims to maintain, increase, or enable carbon and nutrient cycling and connectivity. | Icon indicating an environmental objective in this system benefits fish populations |
| Autumn/winter low flow (50-200 ML/day during July to August 2022 and March to June 2023) | * At 50 ML/day:
* maintain a minimum level of connectivity between Gunbower Creek and lagoons during the off-irrigation period and/or when Hipwell channel is operational
* prevent sections drawing down to isolated pools At 200 ML/day:
* maintain connectivity through the length of Gunbower Creek and between lagoons and fishways during the off-irrigation period to provide greater access to food resources over the cooler months, if natural inflows to Gunbower Forest are achieved
 | Icon indicating an environmental objective in this system benefits fish populations |

|  |  |  |
| --- | --- | --- |
| **Potential environmental watering action** | **Expected watering effect(s)** | **Environmental objective(s)** |
| Trigger-based spring/ summer low flow (50- 300 ML/day as required during September to February) | * Dilute carbon-rich water exiting Gunbower Forest at Three Corner Hole to improve water quality (oxygen concentrations) in lower Gunbower Creek if required
 | Icon indicating an environmental objective in this system aims to maintain or increase water quality and/or conditions. |
| **Gunbower Creek (targeting Cohuna Weir)** |
| Spring/summer/autumn low flow (300-400 ML/ day during September to March) | * Maintain habitat and food resources for native fish and support breeding and larval survival (such as Murray cod) by minimising large variations in the water level during the irrigation season and achieving about 1.5 m depth in deeper pools and 30 cm depth in the shallow connecting littoral

zone to maintain habitat. A greater area of habitat will be inundated at the upper magnitude | Icon indicating an environmental objective in this system benefits fish populations |
| Summer/autumn/winter fresh(es) flow (500 ML/ day for one to four weeks during July to August 2022 or January to June 2023, as required) | * Increase flowing habitat in Gunbower Creek to provide providing preferred hydraulic conditions for native fish
 | Icon indicating an environmental objective in this system benefits fish populations |

**Scenario planning**

[Table 5.2.8](#_bookmark3) outlines potential environmental watering and expected water use under a range of planning scenarios.

**Table 5.2.8 Potential environmental watering for Gunbower Creek and Forest under a range of planning scenarios**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Planning scenario** | **Drought** | **Dry** | **Average** | **Wet** |
| Expected conditions | * No natural inflow into Gunbower Forest
 | * No natural inflow into Gunbower Forest
 | * Minor natural inflow into Gunbower Forest may occur in winter/spring
 | * Overbank flow is likely in winter/ spring
 |
| **Gunbower Forest** |
| Potential environmental watering – tier 1 (high priorities)1 | * Gunbower Forest floodplain, floodrunners and wetlands inundation in winter/spring 2022
* Spring fresh in Yarran Creek
* Black Swamp, Reedy Lagoon, Little Gunbower Creek Complex, Little Reedy Wetland Complex top-up in spring/summer, if required
* Gunbower Forest floodplain, floodrunners and wetlands inundation in autumn/winter 2023 (Part A)
 | * Extend natural flooding in Gunbower Forest floodplain, floodrunners and

wetlands in winter/ spring 2022* Spring fresh in Yarran Creek
* Black Swamp, Reedy Lagoon, Little Gunbower Creek Complex, Little Reedy Wetland Complex top-up, if required
* Gunbower Forest floodplain, floodrunners

and wetlands inundation in autumn/winter 2023 (Part A) |
| Potential environmental watering – tier 2 (additional priorities) | * N/A
 |
| **Gunbower Creek (targeting Koondrook Weir)** |
| Potential environmental watering – tier 1 (high priorities)1 | * Autumn/winter low flow
 | * Autumn/winter low flow
* Trigger-based spring/summer low flow, if required
 |
| Potential environmental watering – tier 2 (additional priorities) | * N/A
 | * Year-round opportunistic flow
 |
| **Gunbower Creek (targeting Cohuna Weir)** |
| Potential environmental watering – tier 1 (high priorities)1 | * Spring/summer/autumn low flow
 |
| Potential environmental watering – tier 2 (additional priorities) | * N/A
 | * Summer/autumn/ winter fresh(es)
 |
| Possible volume of water for theenvironment required to achieve objectives | * Up to 115,000 ML (tier 1)
 | * Up to 115,000 ML

(tier 1)* 4,000 ML (tier 2)
 |
| Priority carryover requirements for 2023-24 | * 60,000 ML
 | * 56,000 ML
 |

1 Tier 1 potential environmental watering at Gunbower Creek and Forest is not classified into tier 1a and 1b because the water available for use is shared across various systems, and it is not possible to reliably estimate supply.

1. This potential watering action is proposed to commence in May or June 2023 and conclude in spring 2023. Part A represents the component proposed to be delivered in the 2022-23 water year and Part B represents the component proposed to be delivered in the 2023-24 water year. If Part A is delivered, then Part B will be included in the *Seasonal Watering Plan 2023-24.*  [↑](#footnote-ref-2)