

Approved Conservation Advice for *Craterocephalus fluviatilis* (Murray hardyhead)

(s266B of the *Environment Protection and Biodiversity Conservation Act 1999*)

This Conservation Advice has been developed based on the best available information at the time this Conservation Advice was approved; this includes existing plans, records or management prescriptions for this species.

Description

Craterocephalus fluviatilis, McCulloch 1912, Family Atherinidae, also known as Murray hardyhead, are a small highly mobile schooling fish that attains 76 mm length (Ivantsoff and Crowley, 1996; Ebner and Raadik, 2001; Ellis, 2005). They are moderately deep bodied with a small protrusible mouth which projects forward as a tube when open (Crowley and Ivantsoff, 1990; Ellis, 2005). The colour varies from silver or silvery-green to dark golden dorsally, with a silvery-black (sometimes golden or reddish) mid-lateral stripe running along the body, and a pale abdomen with a silvery iridescent sheen (Crowley and Ivantsoff, 1990; Ellis, 2005; Hammer and Wedderburn, 2008). The body and fins may develop an orange sheen during the spawning period (Ebner and Raadik 2001; Ellis, 2005).

Conservation Status

The Murray hardyhead is listed as **endangered**. This species is **eligible** for listing as **endangered** under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act) as:

- it has undergone a severe reduction in numbers in the last 10 years, and recovery may depend upon translocations or restocking of hatchery-bred fish, and
- it has a restricted area of occupancy, which is precarious for the species' survival due to ongoing threats (TSSC, 2011).

The Murray hardyhead is also listed as:

- critically endangered under the New South Wales *Fisheries Management Act 1994*
- threatened under the Victorian *Flora and Fauna Guarantee Act 1988* and ranked as critically endangered for management purposes (VIC DSE, 2007)
- critically endangered under draft threatened species schedules under the South Australian *National Parks and Wildlife Act 1972*.

Distribution and Habitat

The Murray hardyhead is endemic to the lowland reaches of the Murray and Murrumbidgee rivers and their tributaries, floodplain billabongs and lakes. The species formerly was abundant from Lake Alexandrina, near the mouth of the Murray River, to as far upstream as Yarrowonga on the Murray and Narrandera on the Murrumbidgee River (Ivantsoff and Crowley, 1996; Hammer et al., 2002; Ellis, 2005).

The Murray hardyhead has undergone a severe reduction in range and abundance. The species is extinct in the Murrumbidgee system, and is now found in only a small number of saline deflation basin lakes in Victoria and South Australia, in the middle and lower reaches of the Murray River, and in the Lower Lakes (Ebner et al., 2003; Ellis, 2005; Hammer et al., 2007). Amongst extant populations, four management units have been identified on the basis of genetic data (Wedderburn 2008; Adams et al. 2011).

The Murray hardyhead occurs within the North Central, Mallee and South Australian Murray-Darling Basin (SA MDB) NRM regions. The species' distribution is not known to overlap with any EPBC Act-listed threatened ecological community.

Threats

The Murray hardyhead is now restricted to saline lakes and wetlands along the middle and lower Murray River, and to parts of the Lower Lakes. The species originally had a more continuous distribution along the channels and off-stream habitats of the lower Murrumbidgee and Murray rivers. Its range and abundance declined sharply through the 1950s, 1960s and 1970s, as agriculture, flow regulation and water extractions intensified (Maheshwari et al., 1995; Ebner et al., 2003; Ellis, 2005; Hammer et al., 2007), and alien redfin perch (*Perca fluviatilis*), gambusia (*Gambusia holbrooki*) and carp (*Cyprinus carpio*) invaded these habitats (Cadwallader, 1977; Rowland, 2005; Lintermans, 2007). The Murray hardyhead frequents beds of submergent macrophytes ("water weed") (Wedderburn et al., 2008), and widespread losses of submergent macrophytes following the invasion of carp are likely a strong factor in its decline (Roberts et al., 1995; Roberts and Sainty, 1996; Rhodes, 1999; Potter et al., 2002; Copeland et al., 2003; Gilligan, 2005).

Since the 1990s, increasing river regulation and water abstraction, exacerbated by widespread drought in 2001–2009, reduced connectivity between wetland habitats and caused many to dry out. Ten Murray hardyhead populations were lost during the protracted drought, when there would have been physiological stresses and lack of recruitment associated with extreme salinity levels, nutrients and pH, variable oxygen levels and algal blooms in wetland habitats (Ellis 2005; Dixon et al., 2005; Hammer et al., 2007; Stoessel, 2007, 2008, unpubl. data, 2009). Many saline wetlands are maintained partially by irrigation run-off, but inflows have been reduced by increased water efficiency by irrigators (Backhouse et al., 2008; Stoessel, unpubl. data, 2009). Other threats include pesticide contamination in irrigation run-off, siltation, barriers to movement and continued competition and predation by alien fish species, particularly carp and gambusia (Ebner et al, 2003; Stoessel, 2007, 2008, unpubl. data, 2009; Wedderburn et al., 2007, 2008).

Alien fish parasites are an emerging threat. Murray hardyhead populations with high levels of parasitic worm infestations have been recorded in Victoria and South Australia (Hammer and Wedderburn, 2008; Ellis, unpubl. data, 2011). These are suspected to be the Asian fish tapeworm (*Bothriocephalus acheilognathi*), brought to Australia with importations of carp and now present throughout the Murray-Darling system (Dove and Fletcher, 2000). The parasite is vectored primarily by carp, and to a lesser extent by gambusia (Dove and Fletcher, 2000). It lodges in the intestine, and can cause heavy mortalities of small or juvenile fish and impaired health and growth in larger fish (Scott and Grizzle, 1979). It has caused mortalities in a native carp gudgeon (*Hypseleotris* sp.) in the ACT (Lintermans, 2007). The effects of this parasite on Murray hardyhead are not yet known.

Research Priorities

Research priorities that would inform future regional and local priority actions include:

- Design and implement a monitoring program or, if appropriate, support and enhance existing programs.
- More precisely assess the ecological requirements of the species and the impacts of alien fish species and macrophyte loss.
- Identify parasitic worms affecting Murray hardyhead populations, their impact, and possible control methods.

Regional and Local Priority Actions

Habitat Loss, Disturbance and Modification

- Monitor populations to establish population numbers, trends and identify key threats.
- Monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them if necessary.
- Identify populations of high conservation priority.
- Manage changes to hydrology that may degrade off-stream wetland habitats (e.g. algal blooms, sedimentation, pesticide pollution).
- Provide environmental watering where necessary to prevent habitats from drying out during drought.
- Investigate macrophyte rehabilitation in any sites where carp removal is achieved.

Establish New Populations

- Enable recovery of additional sites and/or populations.
- Investigate options for linking, enhancing or establishing additional populations.

Alien Species

- Control alien carp (*Cyprinus carpio*) and gambusia (*Gambusia holbrooki*) where possible in Murray hardyhead habitats.

Conservation Information

- Raise awareness of the Murray hardyhead within the local community.

This list does not necessarily encompass all actions that may be of benefit to the Murray hardyhead, but highlights those that are considered to be of highest priority at the time of preparing the Approved Conservation Advice.

Existing Plans that are Relevant to the Species

National Recovery Plan for the Murray hardyhead (*Craterocephalus fluviatilis*) (Backhouse et al., 2008).

These prescriptions were current at the time of publishing; please refer to the relevant agency's website for any updated versions.

Information Sources

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