

4.1.7 Family Gadopsidae: Freshwater Blackfish

The Gadopsidae contains two described species in a single genus in Australian freshwaters, of which one species is recognised as locally threatened. There is thought to be an undescribed species complex consisting of two species within *Gadopsis marmoratus*. Gadopsids are restricted to southeastern Australia. There is one species found in the Upper Murrumbidgee catchment, the Two-spined Blackfish.

Common Name:	Two-spined Blackfish
Scientific Name:	<i>Gadopsis bispinosus</i> Sanger 1984
Other Common Names:	Slippery, Slimy, Greasy, Tailor, Marbled Cod, Nikki, Nikki Long Tom
Other Scientific Names:	None (previously included in <i>Gadopsis marmoratus</i>)



Marbled form.

Photo: N. Armstrong

Biology and Habitat

The Two-spined Blackfish occurs only in inland drainage's of south-eastern Australia where it is restricted to cool, clear upland or montane streams with abundant instream cover, usually in the form of boulders and cobble. They are a small to medium-size species with adults generally 180–250 mm long and less than 200 g. They are found more in the medium to larger streams where there is greater water depth and lower stream velocity, and are not found in the smallest headwater streams. They are generally found in forested catchments, where there is little sediment input to the stream from erosion or other land management practices.

The diet is characterised by a predominance of aquatic insect larvae, particularly mayflies, caddisflies and midges. Terrestrial insects also make up a significant part of the diet, indicating that intact riparian vegetation communities and their associated insect fauna which falls onto the water are important sources of food. Young-of-year and juvenile blackfish eat proportionally more mayfly and midge larvae than adult fish who consume larger items such as caddisfly larvae and terrestrial invertebrates.

Movement of Two-spined Blackfish is extremely limited with home-range of adult fish estimated at approximately 15 metres. Home-ranges are maintained from year to year with fish thought to avoid the high velocity winter flows by sheltering amongst the rocks and boulders on the stream bed.

Breeding is seasonal with egg laying commencing in November, probably induced by a relatively rapid rise in water temperature or change in day-length. Fecundity is low and is positively correlated with fish length. Females are thought to commence breeding in their second or third year. Between 80 and 420 eggs are laid in a single egg mass. The spawning site is usually in a cave or crevice between cobbles or boulders. The eggs are attached to the upper surface of a rock. Two-spined Blackfish will also lay eggs inside PVC pipes placed into streams, and it is thought that all eggs are released at once, and that each egg mass is from a single female. The eggs are large (~3.5 mm diameter), yolky and adhesive and are guarded by the male fish until the larvae have almost fully utilised the yolk reserves and are free-swimming. Hatching occurs after approximately 16 days at a water temperature of 15°C, with the large yolk sac remaining inside the ruptured egg membrane, effectively tethering the young to the spawning substrate until the yolk has been utilised. The larvae have almost fully utilised the yolk after approximately three weeks and then leave the spawning site, with the male guard fish also leaving.

Distribution, Abundance and Evidence of Change

There is little information on the historical distribution of Two-spined Blackfish owing to the relatively recent description of the species. All descriptions made prior to 1984 referred to 'blackfish', with no distinction being made between Two-spined Blackfish and the two forms of the River Blackfish. Recent surveys in the Canberra region have recorded Two-spined Blackfish from the Goodradigbee, Goobarragandra and Cotter rivers, and Jounama and Mountain creeks. A small population has been recently located in the Upper Murrumbidgee River above Yaouk. In the ACT the species is now only present in the Cotter River, although they were formerly present in the Murrumbidgee and Paddys rivers, and are suspected of being historically present in the Naas/Gudgenby system.

Conservation Status			
National	ACT	NSW	VIC
not listed	Vulnerable	not listed	not listed

Fishing Pressure Directed at this Species

Slight.

Stocking Locations

NIL.

Potential Threats

- Habitat destruction through sedimentation which smothers eggs and spawning sites.
- Interactions with trout, particularly predation and competition for food.

Conservation Reserves Where the Species Has Been Recorded

- Stony Creek Nature Reserve
- Namadgi National Park
- Kosciuszko National Park

General References

Jackson *et al.* 1996; Koehn 1987, 1990; Koehn & O'Connor 1990a; Lintermans 1998c; O'Connor *et al.* 2001; Sanger 1984, 1986, 1990.

Local References

ACT Government 1999a; Kalish *et al.* 1998; Macleay 1885; Lintermans 1998c,d, 2001a; Lintermans & Rutzou 1990a,b; Waters *et al.* 1994.



Two-spined Blackfish habitat at Mountain Creek

Photo: M. Lintermans

4.1.8 Family Gobiidae: Gobies and Gudgeons

The Gobiidae is one of the most diverse fish families in Australia, containing about 73 species (a number of which are undescribed) in 27 genera in Australian freshwaters. The Gobiidae contains a number of subfamilies, one of which (Eleotridinae: gudgeons) was formerly considered to warrant family status as the Eleotridae (and is still considered a distinct family by some researchers). Four goby and one gudgeon species are considered nationally threatened. Gudgeons are widespread and common throughout much of Australia. There are two gudgeon species found in the Upper Murrumbidgee catchment, the Western Carp Gudgeon and the Dwarf Flathead Gudgeon.

Common Name: Western Carp Gudgeon

Scientific Name: *Hypseleotris klunzingeri* (Ogilby 1898)

Other Common Names: None. Much of the early literature on Western Carp Gudgeon probably includes information on Three new species, Lake's Carp Gudgeon and Midgely's Carp Gudgeon and Murray-Darling Carp Gudgeon. (There is considerable confusion over the identification of 'carp gudgeons' in south-eastern Australia with three to five species thought to be present, as well as a range of hybrids. In the Southern Tablelands region it is currently thought that there is only a single carp gudgeon species present, the Western Carp Gudgeon).

Other Scientific Names: *Carassiops klunzingeri*



Female.

Photo: M.Hammer

Biology and Habitat

A small species (maximum length 65 mm) which is found in slow-flowing or still waters, normally associated with macrophyte beds or other aquatic vegetation. Early studies of reproduction in 'carp gudgeons' recorded that spawning occurred when water temperature exceeded 22.5°C. Eggs are adhesive and about 0.5 mm

diameter with spawning occurring in shallow water. Hatching occurs after approximately 50 hours, giving rise to larvae between 1.76 and 2.1 mm long. It is unknown which species of 'carp gudgeon' this reproductive data refers to as it was gathered before the uncertain taxonomic status of the group became apparent. Western Carp Gudgeon in Lake Burley Griffin are primarily a mid-water carnivore although some benthic feeding also occurs. Important dietary items include copepods, aquatic insects, cladocerans and ostracods, with chironomids the most often consumed aquatic insect.

Distribution, Abundance and Evidence of Change

This species is widespread and common at lower altitudes in the region. This species has been recorded from the Molonglo, Murrumbidgee, lower Queanbeyan and lower Cotter rivers, and Ginninderra Creek. It is not found in the Molonglo River upstream of Molonglo Gorge or in the Murrumbidgee River upstream of Tharwa, or the Cotter River upstream of the Cotter reservoir. The species is abundant in Lake Burley Griffin, Lake Ginninderra and Googong Reservoir where it can form a substantial portion of the diet of Golden Perch, Redfin Perch and Brown Trout. The population in Lake Burley Griffin appears to have increased following the depletion of the Redfin Perch population by the EHN virus. The population in Lake Burley Griffin is characterised by an annual die-off in late autumn or early winter of juvenile fish of between 12 and 20 mm length. The cause of the mortality is suspected to be related to stress linked to the onset of low water temperatures and infestation of fish by an introduced cestode *Bothriocephalus acheilognathi*.

The species has not recorded from the Naas, Gudgenby, Orroral, Tidbinbilla, Numeralla, Kybean, Big Badja rivers.

Conservation Status			
National	ACT	NSW	VIC
not listed	not listed	not listed	not listed

Fishing Pressure Directed at this Species

NIL.

Stocking Locations

NIL.

Potential Threats

- infestation with the introduced tapeworm *Bothriocephalus acheilognathi*.

Conservation Reserves Where the Species Has Been Recorded

- Woodstock Nature Reserve
- Lower Molonglo Nature Reserve
- Stony Creek Nature Reserve
- Googong Foreshores
- Bullen Range Nature Reserve

General References

Balcombe & Closs 2000; Bertozzi *et al.* 2000; Cadwallader & Backhouse 1983; Koehn & O'Connor 1990a Larson & Hoese 1996; Merrick & Schmida 1984; Unmack 2000.

Local References

Bowling 1981; Dove 1998, 1999; Dove *et al.* 1997; Lintermans 1995b, 1997a, 1998a; Mockler 1994; Rutzou 1993.

Common Name: Dwarf Flathead Gudgeon
Scientific Name: *Philypnodon* sp. (undescribed)
Other Common Names: Has been confused with *Philypnodon grandiceps* and some references to *P. grandiceps* prior to 1980 probably include Dwarf Flathead Gudgeon.
Other Scientific Names: see other common names.



Photo: N. Armstrong

Biology and Habitat

A small species (rarely more than 45 mm length) which prefers relatively calm waters and occurs over mud and rock substrates or in weedy areas. Nothing is known of the reproductive biology of the species in the wild, and little is known of its general ecology. In aquaria it has been recorded breeding at a temperature range of 19–22°C. The eggs are transparent and tear-drop shaped. The male fish guards the egg mass, fanning them regularly and driving away other fish. It feeds mainly on insects and their larvae and also on crustaceans.

Distribution, Abundance and Evidence of Change

Dwarf Flathead Gudgeons are found in coastal streams from southern Queensland to eastern South Australia. They are also recorded from a few localities in the River Murray in New South Wales and South Australia, with a record from the Bathurst area also. First recorded from the Canberra region in 1993 and only known from a small number of creeks flowing into Lake Burrinjuck. The species has never been recorded from the ACT. Nothing is known of former or present abundance in Lake Burrinjuck.

Conservation Status			
National	ACT	NSW	VIC
not listed	not listed	not listed	Uncertain Status (Koehn & Morison 1990)

Fishing Pressure Directed at this Species

NIL

Stocking Locations

NIL.

Potential Threats

None Known.

Conservation Reserves Where the Species Has Been Recorded

None.

General References

Allen *et al.* 2002; Fletcher 1997; Merrick & Schmida 1984; Larson & Hoese 1996.

Local References

Lintermans 1993a.



Mouth comparison of Flathead (left) and Dwarf Flathead (right) gudgeons

Photo: M. Hammer

4.1.9 Family Parastacidae Freshwater crayfishes

The family Parastacidae forms a diverse group of yabbies and crayfish with more than 100 species in nine genera known from Australia. There are approximately 24 species considered nationally rare or threatened (Horwitz 1990a) There are five species in the Upper Murrumbidgee catchment, the common Yabby *Cherax destructor*, the spiny crayfish *Euastacus crassus* and *E. riekkii*, the Murray River Crayfish *E. armatus* and burrowing crayfish *Engaeus cymus*. One species, Murray River Crayfish is considered threatened in the ACT.

Common Name:	Murray River Crayfish (von Martens 1866)
Scientific Name:	<i>Euastacus armatus</i>
Other Common Names:	Murray Cray, Murray Lobster
Other Scientific Names:	<i>Astacus serratus</i> , <i>Astacopsis serratus</i> , <i>Euastacus serratus</i> , <i>Euastacus elongatus</i>

Biology and Habitat

The Murray River Crayfish is the largest member of the genus *Euastacus* with specimens up to 3 kg recorded. It is reportedly the second largest freshwater crayfish in the world, the largest being the Tasmanian giant freshwater crayfish *Astacopsis gouldii* which has been reported to reach 4.5 kg. *E. armatus* inhabits large and small streams in a variety of habitats including cleared pasture and dry and wet sclerophyll forests at altitudes from close to sea level to over 700 m ASL. The species prefers faster flowing cool water habitats of the main channels of rivers, in contrast to the Yabby, which prefers slow warm water and billabongs.



Photo: N. Gunther Schmida

E. armatus individuals do not reach sexual maturity until they are quite large (15 to 20 cm total length) and between six and nine years old. The larger individuals previously caught in the River Murray may have been from 20–50 years of age, but fishing pressure makes it unlikely that individuals will survive to that age now.

In lowland rivers such as the Murray and lower Murrumbidgee, the species constructs burrows in the clay river banks for shelter. In the upland rivers with stony beds such as the Tumut, Goobarragandra and Upper Murrumbidgee, the species tends to use the interstitial spaces between boulders and cobbles on the river bed for shelter.

Distribution, Abundance and Evidence of Change

The Murray River Crayfish has the largest geographic range of any of the spiny crayfish in Australia. While most spiny crayfish are restricted to the cooler, montane streams, Murray River Crayfish have extended their range into the warmer, lower reaches of the Murray-Darling Basin. Prior to the 1950s the species was found in the River Murray for most of its length in South Australia and New South Wales as well as occurring in its major tributaries in Victoria and New South Wales (with the exception of the Darling River). Its range extended over 800 km east-west and approximately 450 km north-south with the most northerly record of the species near Kandos 160 km west of Newcastle. Murray River Crayfish are now extremely rare in the River Murray downstream of Mildura and are classified as endangered in South Australia. New South Wales populations in the Edwards, Kyalite, Wakool and Neimur Rivers have also declined and it is now considered rare in these rivers where it was once plentiful.

Within the ACT, *E. armatus* is mainly found in the Murrumbidgee River. The only other streams in the ACT in which the species has been reported are the lower Cotter River and lower Paddys River, with a single record from the lower Gudgenby River. The report of this species from small montane streams in the ACT (National Capital Development Commission 1984) is most likely to be an error and probably refers to the closely-related *E. crassus*. *E. armatus* is still known to occur in the section of the Cotter River below Cotter Dam. The species has recently been recorded immediately upstream of Cotter Dam.

In recent years in the ACT, it is suspected that *E. armatus* has been illegally translocated by anglers into a number of lakes and ponds. Water bodies in which it is suspected that the species has been introduced include Lake Ginninderra, Lake Burley Griffin, dams at the Canberra racecourse and ponds at Technology Park in Bruce. It is also likely that Murray River Crayfish have been translocated into the Yass River near Sutton in NSW. The origin of stock for most of these translocations appears to be impoundments on the Tumut River, particularly Blowering Reservoir and Jounama Pondage. In the Canberra region, *E. armatus* is known to inhabit the Tumut, Goobarragandra and Goodradigbee river systems. A single newspaper report from 1991 (Queanbeyan Age, 6 May 1991) records them from the Queanbeyan River. The species was historically present in the Yass River (Bennett 1834), although its current status in this waterway is unknown. The species is also known from Lake Burrinjuck on the Murrumbidgee River downstream from Canberra.

A survey of the distribution and abundance of *E. armatus* in the Murrumbidgee River in 1988–89 found the abundance and size of *E. armatus* at individual sites to be inversely proportional to the ease of recreational access (and hence fishing pressure). At one site it is known that one or two anglers had virtually removed all the large crays in a 12 month period. The absence of larger individuals during the 1988–89 survey is a strong indication of high levels of fishing pressure. The population was resurveyed in 1998 with the slight recovery evident in the distribution and abundance of the species (Lintermans 2002c).

Conservation Status			
National	ACT	NSW	VIC
Indeterminate (Horwitz 1990a)	Vulnerable	not listed	not listed

Fishing Pressure Directed at this Species

- Formerly moderate in the ACT but now protected under the *Nature Conservation Act 1980*.
- Moderate fishing pressure in surrounding areas of NSW.

Stocking Locations

Nil (Illegally translocated into Lake Ginninderra).

Potential Threats

- Overfishing can quickly deplete local populations.
- Sedimentation may smother refuge habitats on the river bed.
- Introduction of diseases and parasites through translocation of other crayfish species into the ACT.

Conservation Reserves Where the Species Has Been Recorded

- Woodstock Nature Reserve
- Bullen Range Nature Reserve
- Stony Creek Nature Reserve
- Gigerline Nature Reserve
- Kosciuszko National Park

General References

Morgan 1986; Morison 1988; Horwitz 1990a;b, 1995; Geddes 1990; Barker 1990; Merrick 1995, McKinnon 1995; Asmus 1999.

Local References

Bennett 1834; Morgan 1986; Lintermans 1992c, 1993c; Lintermans & Rutzou 1991b; ACT Government 1999d.