

4.2.2 Family Cyprinidae: Carps, Minnows etc.

The Cyprinidae is one of the largest fish families with more than 1700 species world-wide. There are no native cyprinids in Australia. A number of cyprinids have been widely introduced to other parts of the world with four species in four genera which have been introduced to Australia. There are two species found in the ACT and surrounding area, Carp and Goldfish.

Common Name:	Goldfish
Scientific Name:	<i>Carassius auratus</i> Linnaeus 1758
Other Common Names:	Common Carp, Crucian Carp, Prussian Carp,
Other Scientific Names:	None



Usual wild colour.

Photo: N. Armstrong

Biology and Habitat

Goldfish are usually associated with warm, slow-flowing lowland rivers or lakes. They are often found in association with aquatic vegetation. Goldfish spawn during summer with fish maturing at 100–150 mm length. Eggs are laid amongst aquatic plants and hatch in about one week. The diet includes small crustaceans, aquatic insect larvae, plant material and detritus. Goldfish in the Canberra region are often heavily infected with the parasitic copepod *Lernaea* sp. A consignment of Goldfish from Japan to Victoria is believed to be responsible for introducing to Australia the disease 'Goldfish ulcer', which also affects salmonid species such as trout. Apart from the introduction of this disease, the species is generally regarded as a 'benign' introduction to Australia, with little or no adverse impacts documented.

Distribution, Abundance and Evidence of Change

Goldfish are native to eastern Asia and were first introduced into Australia in the 1860s when it was imported as an ornamental fish. Goldfish were introduced to the Upper Murrumbidgee catchment in 1888 when 20 were released into Cotter, Queanbeyan and Molonglo and Naas rivers.

Goldfish are widespread in the Canberra region occurring in the Molonglo, Cotter, Paddys, and Murrumbidgee rivers and Ginninderra, Jerrabomberra and Tuggeranong creeks. Goldfish are often present in substantial numbers in the early phases of Canberra's urban lakes. In Lake Tuggeranong they formed 50 to 70% of the catch in the early 1990s but by 1999 had declined to negligible levels. Similarly they were abundant in Lake Burley Griffin soon after filling, but declined to negligible levels. Such declines in relative abundance are due to the stocking of predatory species such as Murray Cod, Golden Perch and trout, which consume large numbers of Goldfish. Goldfish are present in Cotter Reservoir but not in the river upstream. Goldfish have not been recorded in the Tidbinbilla, Gudgenby, Naas, or Orroral rivers.

Goldfish are common throughout the Upper Murrumbidgee catchment and have been recorded from the Kybean, Bredbo, Numeralla, Yass and Queanbeyan rivers. They have been recorded in the Murrumbidgee River as far upstream as Adaminaby.

Fishing Pressure Directed at this Species

NIL.

Stocking Locations

NIL.

Conservation Reserves Where the Species Has Been Recorded

- Woodstock Nature Reserve
- Stony Creek Nature Reserve
- Bullen Range Nature Reserve
- Gigerline Nature Reserve
- Molonglo Gorge Nature Reserve
- Lower Molonglo Nature Reserve
- Googong Foreshores
- Kosciuszko National Park

General References

Allen *et al.* 2002; Brumley 1996; Hume *et al.* 1983b; Merrick & Schmida 1984.

Local References

Dove & Ernst 1998; Lintermans & Kleber 1995; Lintermans & Rutzou 1990c; McArthur 1990; National Trust of Australia 1980.

Common Name: Carp
Scientific Name: *Cyprinus carpio* Linnaeus 1758
Other Common Names: European Carp, Common Carp, Koi Carp
Other Scientific Names: None



Photo: E. Beaton/Environment ACT

Biology and Habitat

Carp, like Goldfish are usually associated with warm, slow-flowing lowland rivers or lakes, and are rarely found in clear, cool swift-flowing streams. Carp are tolerant of a wide range of environmental conditions and are able to survive extremely low levels of dissolved oxygen. Males are sexually mature at 2 to 3 years (300 mm) and females at 3 to 4 years (350 mm). Spawning occurs usually in spring and summer when water temperatures are between 17 and 25°C. Spawning fish congregate in shallow water with egg-laying often heralded by much chasing and splashing as fish break the water surface with their back and tail. Eggs are adhesive and laid in clumps on aquatic vegetation, logs and submerged grass. Eggs are 0.5 mm diameter and hatch in 2 to 6 days depending on water temperature. Carp feed by 'mumbling' in the sediment on the bottom or banks of water bodies. This involves sucking in sediment, sorting the edible items from the inedible sediment, and expelling the sediment through the gill openings. This feeding mechanism has led to considerable concern that carp may be increasing turbidity levels in waterways, and undermining river banks. Dietary items include zooplankton, aquatic insect larvae, crustaceans, molluscs and to a lesser extent plant material. Carp carry the parasitic copepod *Lernaea* sp. which infects a range of native fish species in the Canberra region. Species affected include Mountain Galaxias, Golden Perch, Macquarie Perch, Murray Cod, Oriental Weatherloach, Brown Trout, Rainbow Trout, Goldfish and Redfin Perch.

Distribution, Abundance and Evidence of Change

Carp are native to central Asia and were first introduced into Australia sometime between 1850 and 1870 but remained in two relatively confined locations (Sydney and the Murrumbidgee Irrigation Area) until the early 1960s. These two populations were different strains of the one species and showed no sign of spreading. In the early 1960s a third strain, (the Boolarra strain), was illegally introduced by a fish farmer in Victoria. Legislation was introduced to prevent the cultivation and sale of these fish but it was too late as fish had already been sold and stocked into a number of farm dams, A large eradication program was mounted but it was unsuccessful and it is the Boolarra strain which has rapidly colonised watercourses throughout Australia. A recent genetic study of Carp in Australia has identified a fourth strain (the Koi strain) which is present in Lake Burley Griffin and has been recently illegally introduced to two Tasmanian lakes. This Koi strain lacks the bright orange, black or white colouration seen in aquarium Koi and looks identical to the Boolarra strain.

Carp were first detected in the ACT in 1976 when several individuals were captured in Lake Burley Griffin. It is thought these fish may have been introduced as a contaminant of fish stockings of other species (trout, Murray Cod or Golden Perch). Carp are now present in all of Canberra's urban lakes. Carp are present in the majority of ACT rivers and creeks with the exception of the Tidbinbilla, Naas, Orroral rivers, the Cotter River (upstream of Cotter dam) and the Queanbeyan River (upstream of Googong Reservoir). Two large Carp were captured in Googong Reservoir 1990 and there were unconfirmed angler reports of Carp from this water body in May 1999, but Carp are not yet established in this water body. They are present in the Murrumbidgee River up to and above Cooma, the Bredbo, Numeralla, Yass, Kybean and Goodradigbee rivers in the Upper Murrumbidgee catchment. Carp comprise around 70% of the fish biomass in the Murrumbidgee River in the ACT and between 70 and 90% of the fish biomass in Canberra's urban lakes.

Fishing Pressure Directed at this Species

Enthusiastically sought after by anglers of Asian and European descent, they are poorly regarded by most Australian anglers.

Stocking Locations

NIL.

Conservation Reserves Where the Species Has Been Recorded

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

General References

Brown 1996; Brumley 1996; Driver *et al.* 1997; Hume *et al.* 1983a,b; King *et al.* 1997; Koehn *et al.* 2000; Merrick & Schmida 1984; Roberts & Ebner 1997; Roberts & Tilzey 1997; Robertson *et al.* 1997; Shearer & Mulley 1978.

Local References

Davis 1996; Davis *et al.* 1998; Dove & Ernst 1998; Faragher & Lintermans 1997; Lintermans 1991b, 1992a,b, 1995a,b,c, 1996, 1997a,b, 1998a,b, 1999; Lintermans & Rutzou 1990c,d, 1991a; Lintermans & Kleber 1995; Robinson 1982; Swirepik 1999.

4.2.3 Family Cobitidae: Loaches

The Cobitidae is a large family native to Europe and Asia and are popularly kept as aquarium fish.

A single species, Oriental Weatherloach, has been widely introduced to other parts of the world including Australia. This species is found in the ACT and surrounding area.

Common Name:	Oriental Weatherloach
Scientific Name:	<i>Misgurnus anguillicaudatus</i> (Cantor 1842)
Other Common Names:	Japanese Weatherloach, Japanese Weatherfish, Japanese Loach, Mud Loach, Weatherfish, Dojo,
Other Scientific Names:	<i>Misgurnus fossilis anguillicaudatus</i> , <i>Cobitis fossilis</i> , <i>Cobitis anguillicaudatus</i>



Photo: N. Armstrong

Biology and Habitat

Oriental Weatherloach is a bottom-dwelling fish, native to central and eastern Asia. In the local region they grow to approximately 200 mm length. In Australia it has been imported since the 1960s and was a popular aquarium fish. It was first detected as a breeding population in the wild in Australia in 1984, and its importation was banned in 1986. It is commonly found in slow-flowing or still water with sand or mud substrates into which it can burrow to escape predation or aestivate. Oriental Weatherloach occur in a range of habitats from degraded urban and rural streams and ponds to relatively pristine headwater streams. They can utilise atmospheric oxygen by 'gulping' air and passing it through a highly vascularised hindgut. The species is eurythermal and thrives in water temperatures from 2–30°C and has been recorded in thermal springs at temperatures up to 38°C. The species can move overland to disperse and colonise new water bodies. Weatherloach are multiple spawners, laying 4,000–8,000 eggs per spawning with the spawning site being aquatic vegetation or mud. Eggs are approximately 1.5 mm diameter. Fish are mature at approximately 100 mm total length and may live for up to 13 years. Spawning occurs in summer with eggs hatching after 2–3 days.

The diet in the ACT consists of aquatic insect larvae, rotifers, algae, micro-crustaceans and detritus, with significant dietary overlap recorded with the native fish species *Galaxias olidus*. Prey is sensed using a combination of chemical and tactile cues.

Distribution, Abundance and Evidence of Change

This species has established feral populations in six mainland states of the USA as well as Hawaii, Palau, and the Philippines. The species is now established in Australia in the ACT, New South Wales, Victoria and Queensland. Oriental Weatherloach were first recorded in the ACT in 1980 when a single individual was captured in Lake Burley Griffin. A population became established in Ginninderra Creek by 1986 and this population has now colonised almost the entire length of the creek above and below Lake Ginninderra. It has also spread into the Murrumbidgee River and is established in Lake Burrinjuck. Additional populations have been detected in the Cotter River above and below Cotter Reservoir, Tuggeranong Creek, Paddys River, Molonglo River above Lake Burley Griffin, Queanbeyan River below Queanbeyan weir, and Lake Eucumbene. Recent unconfirmed reports also suggest it is present in Jerrabomberra Creek. Illegal use as live bait by anglers is thought to be a significant factor in their spread between drainage systems in the Canberra region. Regular monitoring of ACT populations indicates that this species does not easily spread upstream unassisted.

Fishing Pressure Directed at this Species

Harvested and used illegally as a bait fish.

Stocking Locations

NIL.

Conservation Reserves Where the Species Has Been Recorded

- Gigerline Nature Reserve
- Bullen Range Nature Reserve
- Woodstock Nature Reserve
- Molonglo Gorge Nature Reserve

General References

Allen 1984; Burchmore *et al.* 1990; Lintermans & Burchmore 1996; McMahon & Burggren 1987; Sterba 1962; Suzuki 1983; Watanabe & Hidaka 1983; Welcomme 1988.

Local References

Dove 1999; Dove & Ernst 1998; Lintermans 1993a,b,1995b, 1997a, 1998a,b; Lintermans *et al.* 1990a,b; Rutzou 1991; Swales 1992.

4.2.4 Family Poeciliidae: Livebearers

The Poeciliidae are popular aquarium fish that give birth to live young rather than laying eggs. Swordtails, mollies and guppies are three well known examples of this family. There are no native poeciliids in Australia. A number of poeciliids have been widely introduced to other parts of the world for either mosquito control or as aquarium species. Six species in four genera have become established in Australia. There is a single species found in the ACT and surrounding area, Eastern Gambusia.

Common Name:	Eastern Gambusia
Scientific Name:	<i>Gambusia holbrooki</i> (Girard 1859)
Other Common Names:	Gambusia, Mosquitofish, Top Minnow, Plague Minnow
Other Scientific Names:	<i>Gambusia affinis</i>



Male above, female below.

Photo: MDBC

Biology and Habitat

A small fish (maximum length 60 mm) which is commonly found in lakes or still or slow flowing streams, mostly around the edges or in aquatic vegetation. Eastern Gambusia are mature at about 25 mm long, and do not lay eggs but produce live young. The fertilised eggs develop inside the female with the young being a few millimetres long when born. Maturity can be reached after only 2 months and individuals can breed several times a year. Breeding occurs during the warmer months with a female producing about 50 young in each batch, with up to nine batches per year.

Eastern Gambusia are tolerant of a wide range of water temperatures, oxygen levels, salinities and turbidities, and because of their ability to breed rapidly, have assumed plague proportions in many habitats. Often referred to as 'Mosquitofish', they were introduced into Australia for mosquito control in the 1920s but

unfortunately mosquito larvae do not figure prominently in their diet. Consequently, 'Mosquitofish' should not be used as the common name as it implies some environmental or social benefit, which is largely incorrect. Eastern Gambusia are primarily carnivorous with the diet containing a range of small aquatic invertebrates and wind-blown terrestrial insects.

They are an aggressive species which will chase and fin-nibble fish much larger than themselves. They also prey on the eggs of native fish and amphibians. Eastern Gambusia are implicated in the decline of some 30 fish species world-wide, at least 9 of which occur in Australia. They have recently been listed as a key threatening process for amphibian populations in NSW, and are implicated in the decline of more than 10 species of frogs in Australia.

Distribution, Abundance and Evidence of Change

Native to rivers draining to the Gulf of Mexico, Eastern Gambusia were introduced into Australia in 1925. Further introductions were made by health authorities in the 1930s and the species was distributed to many military camps during the second World War. The species is now widely distributed throughout Australia. Eastern Gambusia are widespread throughout the warmer lowland waters in the Canberra region and have been recorded in the Molonglo, Murrumbidgee, lower Cotter, lower Paddys, and Queanbeyan rivers as well as Ginninderra, Jerrabomberra and Tuggeranong creeks. They are commonly found in farm dams and shallow wetlands.

They have not been recorded from higher, cooler waters in the ACT including the Naas, Gudgenby, Orroral, and Tidbinbilla rivers, or the Cotter River upstream of Cotter Reservoir. They can however survive in such waters if they are introduced, with the species recorded from the Snowy Mountains at an altitude of 1,300 m.

Fishing Pressure Directed at this Species

NIL.

Stocking Locations

NIL.

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
- Canberra Nature Park
- Gigerline Nature Reserve
- Kosciuszko National Park
- Molonglo Gorge Nature Reserve
- *Tinderry Nature Reserve

* = expected occurrence

General References

Aarn & Ivantsoff 2001; Arthington *et al.* 1986; Lloyd *et al.* 1986; Lloyd & Tomasov 1985; McDowall 1996d; Merrick & Schmida 1984; Pen & Potter 1971.

Local References

Faragher & Lintermans 1997; Lintermans. 1991b, 1995b, 1997a, 1998a,b, Lintermans *et al.* 2001; Lintermans & Rutzou 1990c.

4.2.5 Family Percidae: Freshwater Perches

The Percidae is a small family native to the cool-temperate waters of the Northern Hemisphere. There are no native percids in Australia. A single species, Redfin Perch, has been introduced to Australia. This species is found in the ACT and surrounding area.

Common Name:	Redfin Perch
Scientific Name:	<i>Perca fluviatilis</i> Linnaeus 1758
Other Common Names:	Redfin, English Perch, European Perch
Other Scientific Names:	None



Photo: E. Beaton/Environment ACT

Biology and Habitat

A moderate-size fish (maximum weight 10 kg, commonly 1–2 kg) which mainly occurs in slow-flowing or still water habitats, especially where aquatic vegetation is abundant. Fish are generally mature after 2–3 years, but males may mature at the end of the first year. A characteristic of the species is the propensity to 'stunt' under conditions of poor food availability or overcrowding, with individuals maturing at a very small size (approx. 120 mm length). Spawning occurs in spring when water temperature reaches 12°C, with thousands of eggs laid as gelatinous ribbons amongst aquatic vegetation. Eggs are 2–3 mm diameter and hatch in 1–2 weeks with juvenile fish forming large schools. The diet includes crustaceans, zooplankton and small fish with Western Carp Gudgeon and Eastern Gambusia often recorded in the diet in Canberra's urban lakes. Redfin Perch are the main host for a virus, Epizootic Haematopoietic Necrosis Virus (EHNV). This virus, unique to Australia, was first isolated in 1985 on Redfin Perch. It is characterised by sudden high mortalities of fish

displaying necrosis of the renal haematopoietic tissue, liver, spleen and pancreas. Experimental work has demonstrated that Macquarie Perch are one of several species found to be extremely susceptible to the disease. Macquarie Perch were held in aquaria and exposed to low concentrations of EHNV in water with all ten fish in two separate trials dying within five days.

EHNV was first recorded from the Canberra region in 1986 when an outbreak occurred in Blowering Reservoir near Tumut. Subsequent outbreaks were confirmed in Lake Burrinjuck in late 1990, Lake Burley Griffin in 1991 and 1994, Lake Ginninderra and Googong Reservoir in 1994. EHNV outbreaks now occur regularly in Canberra's urban lakes.

Distribution, Abundance and Evidence of Change

Redfin Perch were first introduced to Tasmania in 1862 and to Victoria in 1868. This species is widely distributed throughout the temperate portion of the Murray-Darling Basin, being absent from the colder headwaters and the hotter reaches of the Darling drainage. Their distribution is largely explained by their temperature tolerance, being able to survive in water temperatures up to about 31°C. Redfin Perch were first introduced to the Canberra region when 50 were released into the Queanbeyan, Molonglo, Naas and Cotter rivers in 1888. However, this introduction was apparently unsuccessful as no further mention is made of the species until they were stocked by NSW Fisheries into Lake George in 1959. Here they remained until a sequence of events led to them colonising Lake Burley Griffin in mid-1983 (see Lintermans *et al.* 1990b). They were first detected in both Lake Ginninderra and Googong Reservoir in 1988 and are also present in Lake Tuggeranong and Gungahlin Pond. They rapidly increased in numbers in the urban lakes and by 1989 formed 58% of the total catch in Lake Burley Griffin. The numbers of Redfin Perch in both Lake Burley Griffin, Lake Ginninderra and Googong Reservoir all declined dramatically after the outbreak of EHN Virus in these water bodies in the early to mid 1990s. Redfin now comprise around 10–15% of the catch in Lake Burley Griffin.

Redfin Perch were first recorded in the Murrumbidgee River at the Casuarina Sands fishtrap in 1986, with generally only 2–3 fish captured at any one time. In October 1988, a total of 1,100 small Redfin Perch (average length 135 mm) were removed from the fishtrap on a single day. Six days later another 510 Redfin were removed from the trap and one week later another 291 were removed. Such high numbers were never again encountered up to the removal of the trap and weir in 1991.

Redfin Perch have comprised between 0.5 and 18% (by number) of the catch during the biennial monitoring of the ACT Murrumbidgee River fish populations in 1994, 1996, 1998 & 2000. Redfin Perch have not been recorded in the Naas, Gudgenby, or Orroral rivers, or the Murrumbidgee River above Tharwa.

A recent angler report of the species in Queanbeyan River above Googong Reservoir is of concern as a small but thriving population of Macquarie Perch is located there. This record needs confirmation.

Fishing Pressure Directed at this Species

Moderate. A sought after species in the urban lakes, although stunted individuals may dominate some fisheries.

Stocking Locations

NIL, but it has been recorded as a contaminant of stockings of other fish species.

Conservation Reserves Where the Species Has Been Recorded

- Woodstock Nature Reserve
- Stony Creek Nature Reserve
- Bullen Range Nature Reserve
- Gigerline Nature Reserve
- Molonglo Gorge Nature Reserve
- Lower Molonglo Nature Reserve
- Googong Foreshores
- Kosciuszko National Park

General References

Langdon 1989a,b; Langdon *et al.* 1986; Langdon & Humphrey 1987; McDowall 1996c; Merrick & Schmida 1984; Weatherley 1963, 1977; Weatherley & Lake 1967.

Local References

Kukolic & Rutzou 1989; Faragher & Lintermans 1997; Lintermans 1991b, 1992a,b, 1995a,b,c, 1996, 1997a,b, 1998a,b, 1999; Lintermans & Kleber 1995; Lintermans & Rutzou 1990d, 1991a; Lintermans *et al.* 1990b; National Trust of Australia 1980.



Goodragigbee River: habitat for Macquarie Perch and Redfin Perch

Photo: E. Beaton/Environment ACT