

4.2 Alien Species

There are nine species of alien fish from five families which have established populations in the Upper Murrumbidgee catchment. The majority were introduced in the late 1800s and early 1900s, but a few have only recently become established. Some of the alien species form important recreational fisheries, others are derived from the aquarium trade.

4.2.1 Family Salmonidae: Salmons, Trouts and Chars

The Salmonidae are native to cool waters in the Northern Hemisphere but have been widely introduced to other parts of the world by recreational angling and aquaculture interests. There are five species in three genera which have been introduced to Australia. Salmonids are widespread and common throughout much of the cooler, upland waters in south-eastern Australia. There are four species found in the Upper Murrumbidgee catchment, Rainbow Trout, Brown Trout, Atlantic Salmon, and Brook Char.

Common Name: Rainbow Trout
Scientific Name: *Oncorhynchus mykiss* (Walbaum 1792)
Other Common Names: Steelhead
Other Scientific Names: *Salmo gairdneri*, *S. irideus*



Juvenile with parr marks

Photo: M. Lintermans

Biology and Habitat

A moderate-size fish (maximum weight 10 kg, commonly 1–4 kg) of cool, upland streams and lakes. They have a slightly higher thermal tolerance than Brown Trout with water temperatures above about 27°C causing severe mortality. Other aspects of the species ecology are very similar to Brown Trout, with the diet containing aquatic insect larvae, crustaceans, snails, small fish and wind-blown terrestrial insects. In the Canberra region there is a tendency for Rainbow Trout to feed at the water surface more than Brown Trout. The species spawns from July–October with fish maturing at 2–3 years of age. The female constructs a nest in gravel where the slightly adhesive, demersal eggs are deposited. The eggs are large (4–5 mm diameter) and hatch in 3–12 weeks depending on water temperature. Rainbow Trout have had a significant impact on the distribution and abundance of the native Mountain Galaxias. In the upper Cotter catchment in the ACT the two species have an almost mutually exclusive distribution with galaxiids unable to survive in the presence of Rainbow Trout. An experimental removal of Rainbow Trout from a section of Lees Creek in the lower Cotter catchment has resulted in rapid recolonisation by Mountain Galaxias. However there has been no recolonisation of the creek sections where Rainbow Trout are still present. Mountain Galaxias can still survive in locations where trout access is prevented by waterfalls, swamps etc. Rainbow Trout are still expanding their range in the ACT, with a population recently established above Gibraltar Falls. This range expansion must have been human assisted as the falls are too high to have been bypassed naturally. It is expected that, unless this new trout population can be eradicated, the native Mountain Galaxias will be eliminated from yet another stream in the ACT. Rainbow Trout are often found with the parasitic copepod *Lerneae sp.* attached, particularly around the fins. During times of heat stress, the species is prone to heavy infestation from this parasite, with large red sores from secondary infection obvious.

Distribution, Abundance and Evidence of Change

Rainbow Trout are native to the western coastal drainages of North America. They were first introduced to Australia in 1894, from New Zealand where the species had been introduced from California. They are present in the ACT, New South Wales, Victoria, Tasmania and South Australia. They were first introduced to the Canberra region in the 1890s and are now established in the majority of rivers of the ACT and surrounding NSW. Recorded from Paddys, Cotter, Naas, Gudgenby, Orroral, Murrumbidgee, and Molonglo rivers as well as Ginninderra, Tuggeranong, and Jerrabomberra creeks in the ACT. Recorded from the Goodradigbee, Yass, Bredbo, Numeralla, Kybean, Big Badja, and Queanbeyan rivers in adjacent areas of NSW. The species is usually found throughout the catchments in which it occurs and can occupy even the smallest headwater streams. Populations in Lake Ginninderra and Lake Burley Griffin have declined since the mid 1980s to the point where they are no longer stocked as survival is poor. Both of these lakes are marginal habitat for Rainbow Trout due to the high summer water temperatures often recorded. Prior to this they provided a successful recreational fishery in both lakes with rapid growth rates and good returns for anglers. The population in Googong Reservoir declined in the late 1980s with Brown Trout now the commoner trout species in this reservoir.

Fishing Pressure Directed at this Species

High.

Stocking Locations

- Lake Burley Griffin (1965–1985, 1995)
- Lake Ginninderra (1977–1988)
- Googong Reservoir (1984–1999)
- Lake Burrinjuck (NSW Fisheries)
- Captains Flat Reservoir (NSW Fisheries)
- Lake George (NSW Fisheries)

Also stocked in numerous rivers in NSW by acclimatisation groups and angling clubs.

Conservation Reserves Where the Species Has Been Recorded

- Woodstock Nature Reserve
- Stony Creek Nature Reserve
- Bullen Range Nature Reserve
- Gigerline Nature Reserve
- Lower Molonglo Nature Reserve
- Molonglo Gorge Nature Reserve
- Brindabella National Park
- Tidbinbilla Nature Reserve
- Namadgi National Park
- Googong Foreshores
- Kosciuszko National Park
- *Scabby Nature Reserve
- *Bimberi Nature Reserve

* = expected occurrence

General References

Pidgeon 1981; Jackson & Williams 1980; Merrick & Schmida 1984; Fletcher 1986; Davies & McDowall 1996.

Local References

Graham *et al.* 1986; Jones *et al.* 1990; Rutzou *et al.* 1994; Lintermans 1991b, 1992d, 1995b, 1996, 1997a, 1998a,b,c,d; Faragher & Lintermans 1997 2000a,b; Kukolic & Rutzou 1989.



Juvenile showing parr marks (dark blotches) on sides

Photo: M. Lintermans

Common Name: Brown Trout
Scientific Name: *Salmo trutta* Linnaeus 1758
Other Common Names: Sea Trout, Englishman
Other Scientific Names: *Salmo fario*



Photo: N. Armstrong

Biology and Habitat

A moderate-size fish (maximum weight 20 kg, commonly 1–4 kg) of cool upland streams and lakes. The diet contains a wide variety of aquatic insect larvae, crustaceans, small fish, snails and wind-blown terrestrial arthropods. There is a tendency for Brown Trout to become the dominant species in impoundments where both Rainbow and Brown Trout are present. Brown Trout spawn earlier than Rainbow Trout with spawning occurring between April and August. Like Rainbow Trout, the eggs are deposited in a gravel nest in flowing water constructed by the female. The eggs are large (4–5 mm diameter) and hatch in 6–20 weeks depending on water temperature. Brown Trout are slightly less tolerant than Rainbow Trout of warm water, preferring temperatures below 25°C. Brown Trout are often found with the parasitic copepod *Lerneae* sp. attached, particularly around the fins. As with Rainbow Trout, Brown Trout have had a serious impact on the distribution and abundance of the native Mountain Galaxias in the ACT and south-eastern Australia. Brown Trout are suspected of having deleterious impacts on a number of native threatened fish species such as Trout Cod and Macquarie Perch. Consequently they are no longer stocked in Googong Reservoir or streams of the Upper Murrumbidgee catchment where threatened species are known to be present.

Distribution, Abundance and Evidence of Change

Brown Trout are native to Europe and western Asia and were first introduced to Australia in 1864. They were first successfully introduced into NSW and the Canberra region in 1888 when a number were released into the Cotter, Naas, Molonglo and Queanbeyan rivers. Earlier local releases had apparently been unsuccessful. The species is now found in most suitable streams in the ACT with records from the Paddys, Cotter, Naas, Gudgenby, Orroral, Murrumbidgee, and Molonglo rivers as well as Ginninderra, Tuggeranong, and Jerrabomberra creeks in the ACT. It has been recorded from the Goodradigbee, Yass, Bredbo, Numeralla, Kybean, Big Badja, and Queanbeyan rivers in adjacent areas of NSW. Brown Trout are not found upstream of Bendora Dam in the Cotter catchment and do not seem to be as prevalent as Rainbow Trout in the small headwater streams of the ACT. The urban lakes are considered marginal habitats for Brown Trout because of their high summer water temperatures. The population in Googong Reservoir, after declining in the late 1980s, appears to have stabilised and is still regularly targeted by anglers, with specimens in excess of 4 kg regularly taken.

Fishing Pressure Directed at this Species

High, along with Rainbow Trout.

Stocking Locations

- Lake Burley Griffin (1965–1981, 1987, 1997)
- Lake Ginninderra (1977–1981, 1996)
- Googong Reservoir (1993–1997)
(no longer stocked)
- Lake Burrinjuck (NSW Fisheries)
- Captains Flat Reservoir (NSW Fisheries)
- Lake George (NSW Fisheries)

Also stocked in numerous rivers in NSW by acclimatisation groups and angling clubs.

Conservation Reserves Where the Species Has Been Recorded

- Woodstock Nature Reserve
- Stony Creek Nature Reserve
- Bullen Range Nature Reserve
- Gigerline Nature Reserve
- Lower Molonglo Nature Reserve
- Molonglo Gorge Nature Reserve
- Tidbinbilla Nature Reserve
- Namadgi National Park
- Googong Foreshores
- Brindabella National Park
- Kosciuszko National Park
- *Bimberi Nature Reserve
- *Scabby Nature Reserve

*= expected occurrence

General References

Cadwallader 1996; Clements 1988; Davies & McDowall 1996; Fletcher 1979, 1986; Jackson 1978, 1980, 1981; Jackson and Williams 1980; Merrick & Schmida 1984; Tilzey 1976, 1977.

Local References

Faragher 1986; Faragher & Lintermans 1997; Jones *et al.* 1990; Kukolic & Rutzou 1989; Lintermans 1991b, 1995b, 1997a, 1998a,b, 2000a; Lintermans & Rutzou 1990b; National Trust of Australia 1980; Rutzou *et al.* 1994.

Common Name: Atlantic Salmon
Scientific Name: *Salmo salar* Linnaeus 1758
Other Common Names: None
Other Scientific Names: None



Photo: K. Hall

Biology and Habitat

A moderate-size species (maximum weight 38 kg in Europe, commonly 1–3 kg in Australia) of cool streams and lakes which has not established significant populations in Australia. Their ecology is very similar to Brown Trout although very little has been published on their habits in Australia. It is a species which is popular in aquaculture.

Distribution, Abundance and Evidence of Change

Native to rivers draining to the North Atlantic ocean, Atlantic Salmon were first introduced to Australia between 1864 and 1870 when it was released in Tasmania and Victoria, but with little success. Eggs were imported from Canada in 1963 and the species is now regularly stocked into Lake Burrinjuck and Lake Jindabyne. The species continued presence in these water bodies is thought to be wholly dependant on the stocking program, with no natural recruitment occurring. There have been occasional angler reports of this species from the Murrumbidgee River in the ACT, but they are unconfirmed. Confusion in identification between Atlantic Salmon and Brown Trout is likely as it is difficult to confidently distinguish between the two species. In Atlantic Salmon the tail is slightly more deeply forked, the mouth is smaller and does not reach back past the eye. Atlantic Salmon do not have an orange margin to the adipose fin, and the caudal peduncle is more slender than in Brown Trout.

Fishing Pressure Directed at this Species

Slight.

Stocking Locations

- Lake Burrinjuck (NSW Fisheries).

Conservation Reserves Where the Species Has Been Recorded

None.

General References

Cadwallader 1996; Clements 1988; Davies & McDowall 1996; Merrick & Schmida 1984; Scott & Crossman 1973.

Local References

Burchmore *et al.* 1988; Faragher 1986; Francois 1965; Lintermans 2000a.



Note that mouth does not extend behind the eye

Photo: K. Hall

Common Name: Brook Char
Scientific Name: *Salvelinus fontinalis* (Mitchill 1815)
Other Common Names: Brook Trout, Fontinalis
Other Scientific Names: None



Photo: N.Armstrong

Biology and Habitat

A moderate-size (maximum length 850 mm, maximum weight 6.5 kg), cool-water species of clear streams and lakes, this species does not coexist well with other salmonids. Only a single self-sustaining population is known for mainland Australia (New England tablelands) although self-sustaining populations are present in Tasmania. Breeding is similar to that of Brown Trout. Diet contains aquatic insects, crustaceans, molluscs and terrestrial insects as well as small fish.

Distribution, Abundance and Evidence of Change

Brook Char are native to the east coast of North America and were introduced to Australia in the 1870s. Brook Char were stocked in the Canberra region in the 1970s but did not establish reproducing populations. Sometimes disparagingly referred to as 'soluble trout' because of their reputation for disappearing when added to water. A number of individuals were captured from Lake Ginninderra in 1993 after an illegal release of unwanted fish from a backyard swimming pool.

Fishing Pressure Directed at this Species

Minimal.

Stocking Locations

- Lake Ginninderra (1979)
- Lake Burley Griffin (1974–1978)
- Lake Burrinjuck and Yass River (NSW Fisheries)

Conservation Reserves Where the Species Has Been Recorded

Kosciuszko National Park.

General References

Clements 1988; Davies & McDowall 1996; Merrick & Schmida 1984.

Local References

Faragher 1986; Lintermans 1991b, 2000a.