

Great Lake Crustaceans

TASMANIAN THREATENED FAUNA LISTING STATEMENT



SPECIES INCLUDED

Six threatened freshwater crustaceans occur in Great Lake in central Tasmania:

Isopods (Family Phreatoicidae)

Onchotelson brevicaudatus Smith, 1909
Onchotelson spatulatus Nicholls, 1944
Uramphisopus pearsoni Nicholls, 1943
Mesacanthotelson setosus Nicholls, 1944
Mesacanthotelson tasmaniae Thomson, 1894

Amphipod (Family Neonophargidae)

Tasniphargus tyleri Williams and Barnard, 1988

STATUS

Status for all six listed species is:

Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (Not listed)

Tasmanian *Threatened Species Protection Act 1995* (Rare)

IDENTIFICATION

Phreatoicid isopods are small (13mm-22mm), plated, slater-like crustaceans. They have rounded heads, very small eyes and seven pairs of legs. Three of the five species listed are illustrated below:



Onchotelson brevicaudatus. Photo: John Gooderham



Onchotelson spatulatus. Photo: John Gooderham



Mesocanthotelson setosus (female). Photo: John Gooderham



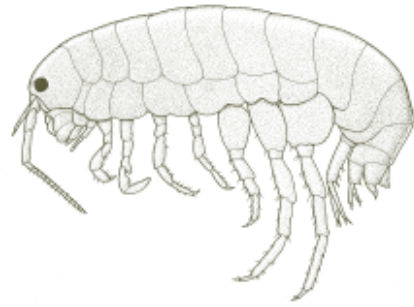
M. setosus (male) Photo: John Gooderham

Onchotelson species have a very rugose body. *O. brevicaudatus* reaches 15 mm and *O. spatulatus* 13 mm. *O. spatulatus* differs from *O. brevicaudatus* and from other Tasmanian phreatoicids by having strong epaulette-like extensions on the side of the body (see image).

Mesocanthotelson tasmaniae (not pictured) is the largest of the species, dark bluish grey in colour, with bars of orange or chestnut on antennae and legs and up to 24 mm long. *M. setosus* is slightly smaller, to 19 mm, and differs in numerous features (most obviously, *M. tasmaniae* is considerably spinier). Two smaller *Mesocanthotelson* species not listed as threatened, *M. fallax* and *M. decipiens*, are also present in Great Lake, but not currently common.

Uramphisopus pearsoni (not pictured) is a relatively robust species, pale brown in colour and up to 22 mm long.

Identification of phreatoicids requires careful, detailed anatomical study and use of keys. See Nicholls (1943 for *U. pearsoni*, 1944 for all other species) for lengthy species descriptions, and the modern key to phreatoicid genera created by Dr George Wilson for more detail (<http://www-personal.usyd.edu.au/~buz/phreakey.html#15>)



Tasniphargus tyleri

The amphipod *Tasniphargus tyleri*, grows to about 13.5 mm. It is visually similar to *Neoniphargus tasmanicus*, another species that occurs in Great Lake, but can be distinguished from all *Neoniphargus* species by having long dense setae (hairs) on the antennae. For a full description see Williams and Barnard (1988). *T. tyleri* otherwise looks so similar to *N. tasmanicus* that the specimens from which the latter was described in 1909 included 10 specimens of *T. tyleri*. Another amphipod present in Great Lake, *Antipodeus ripensis*, differs in many aspects, the simplest being the absence of sternal gills.

ECOLOGY

The largest lake and wetland complex in Tasmania prior to the damming of Lake Pedder, Great Lake is a centre of local endemism for many faunal groups, including freshwater snails, paragalaxid fishes and caddis flies as well as crustaceans. Some of the local endemics occur only in Great Lake, but others are found in a few other nearby water bodies as well. Other threatened species in Great Lake include the paragalaxid fishes *Paragalaxias dissimilis* (Shannon paragalaxias) and *P. eleotroides* (Great Lake paragalaxias) and the snails *Glacidorbis pawpela* (Great Lake Snail) and *Beddomeia tumida* (Great Lake Hydrobiid Snail).

The Great Lake shrimp *Paranaspides lacustris* also occurs in Great Lake and although not listed on either the *EPBC Act* 1999 or the *TSP Act* 1995 is listed on the *IUCN Red List of Threatened Species* and is of high conservation significance.

Phreatoicid isopods are an ecologically diverse “living fossil” group. They are found mainly in Australia, particularly the wetter portions of NSW, Victoria and Tasmania (Wilson 2005). The radiation of these crustaceans in Great Lake is the most diverse in the world.

The first major dam on Great Lake was constructed for hydroelectric power production in 1920. Another dam built in 1964, coupled with dam wall raising have increased the capacity of the Great Lake storage. This has increased the storage’s surface area from 11,330 to 17,612 hectares and significantly deepened a once shallow lake-wetland system (Davies 2001, Hydro Tasmania, 2003). Great Lake was originally several separate lakes and wetlands which could have contributed to its high biodiversity and to some species being confined to particular portions of the lake (Fulton 1983b, Davies 2001).

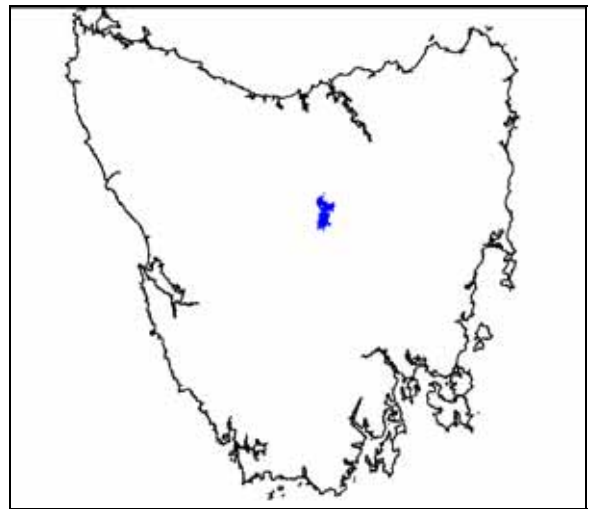
Charophyte algal beds (commonly referred to as “algal beds” or “shrimp beds”) form a very important habitat type within Great Lake (Davies and Cook 2000, Davies 2001, 2002). The location of these beds varies depending on the lake level, but in 2001 most were 2-4 metres below the lake level of the time (Davies 2001). They are typically not present more than 10 metres below the water surface. The densities of phreatoicid isopods generally were three times higher in these algal beds than other habitats such as rocky shores. The amphipod, *Tasniphargus tyleri*, is also associated with these weed beds. However, two of the five species of phreatoicids have different habitat preferences (Davies 2001):

- *Mesocanthotelson tasmaniae* was only found in samples in rocky areas outside charophyte beds.
- *Uramphisopus pearsoni* occurs only in soft sediments in deeper water habitats

Amphipods are omnivores, feeding mainly on decaying vegetation but also on other small animals where they encounter them.

Phreatoicid isopods are detritivores, feeding on leaves and other organic material on the lake floor (Gooderham and Tsyrlin, 2002).

IMPORTANT LOCATIONS



Great Lake is the sole location for all six species, with the following exceptions and restrictions:

- *Uramphisopus pearsoni* is confined to soft sediments in deep water habitats in northern Great Lake (Brandum Bay basin).
- *Mesocanthotelson tasmaniae* is only recorded from Becketts Bay at the southern end of Great Lake.
- *Onchotelson spatulatus* is restricted to Elizabeth Bay on the central eastern side of Great Lake. Elizabeth Bay was originally a separate lake, Lake Elizabeth. (Fulton 1983b, Hydro Tasmania 2003).
- *Onchotelson brevicaudatus* and *Mesocanthotelson setosus* are widespread in Great Lake and also now occur in Shannon Lagoon adjacent to

the southern end of Great Lake (Hydro Tasmania 2003).

THREATS, LIMITING FACTORS AND MANAGEMENT ISSUES

All six species are listed as threatened because of their restricted ranges and potential threats from lake level manipulation. Little is known about their responses to water quality and level, however given that several are associated with charophyte beds, any factor that potentially impacts on these beds may affect some of these species.

In particular, if lake levels become very low (below 1020m ASL) the extent of charophyte beds across the lake bottom is likely to be highly variable and unstable. Major factors contributing to local decline of charophyte beds in Great Lake are: rapid rises and falls in lake level, (exceeding the speed at which the beds move upslope or downslope), loss of sufficient light at depth, increased shear stress on the lake bed due to increased exposure to wind and insufficient lake depth (Davies 2001).

Critical declines in lake level have occurred several times since the damming of the lake (Davies *et al.* 1987, Davies 2001). It is possible that some fauna or flora species have been lost from the lake during these periods, and more data are required to determine whether threatened species, including the crustaceans that inhabit the charophyte beds, are capable of surviving repeated “crunch periods” (Davies 2001, Hydro Tasmania 2003).

Trout are known to feed on isopods and amphipods in Great Lake. Trout were first introduced in 1870 and the lake has been actively managed as a recreational trout fishery since the early 1900s. Given the length of time that trout have occurred in Great Lake it is anticipated that their impact on these threatened species have reached equilibrium. However, the impacts of trout in combination with rapidly changing lake levels on these threatened species is unknown.

There are no known water quality issues within Great Lake that would affect these species apart from the impact of low water levels on turbidity.

HISTORICAL DISTRIBUTION

As the early records came primarily from specimens collected from the stomachs of trout, records prior to those of Fulton (1983a,b) are of little use in establishing the historical distribution of these species within Great Lake. As mentioned under “Important Locations”, two species have spread to the adjacent Shannon Lagoon. Nicholls (1944: 110) states that “Phreatoicids from the Great Lake, Tasmania (presumably a mixed collection)” were introduced to Lake Catani, Victoria, as trout food, but it is unclear which species were released or whether any have survived there.

Area Currently Occupied

Area of occupancy estimates are not available for these species and are likely, in at least some cases, to fluctuate as lake levels rise and fall. However, the areas occupied by each species are believed to be small fractions of the 17,612 ha average surface area of Great Lake, plus the approximately 300 ha of Shannon Lagoon for the two species present there. Even those phreatoicids occurring widely within Great Lake occur inconsistently within given sampling areas. The area of charophyte beds is estimated to be between 100 and 200 hectares depending on lake water levels and the preceding rate of rise and fall.

Population Estimate

No population estimates are available for these species. The mean density of all phreatoicids combined (mainly the *Onchotelson* and *Mesocanthotelson* species) in a recent sample was 27/m² but the peak abundance sampled at any given site was over twenty times that. *Uramphisopus pearsoni* appears to be the rarest of the five

phreatoicids (Davies 2001, Hydro Tasmania 2003).

RESERVATION STATUS

Great Lake is an unreserved water body managed by Hydro Tasmania and the Inland Fisheries Service for a variety of uses, primarily hydro-electricity and recreational trout fishing. Great Lake is surrounded by both reserved and unreserved areas including private land.

ASSESSMENT CRITERIA

All six species are listed as Rare under the Tasmanian *Threatened Species Protection Act* 1997. All qualify for listing by:

- extending less than 100x100 km (A r1)
- occupying 20 or less 10x10 km grid squares (A r2)
- extent of occurrence < 2000 sq km (B)

RECOVERY PROGRAM

Objectives

- Maintain known populations of the species.
- Maintain and monitor habitat quality and extent

Previous Management Actions

Until recent research and subsequent agreements by managers, there had been no active management of Great Lake for these species of crustaceans.

Actions Needed

- Precisely define the distribution and habitat requirements of the species.
- Determine the impacts of water level management on relevant aspects of lake ecology.
- Negotiate formal water resource management prescriptions on lake level elevations and rates of rise and fall that protect these species.
- Increase awareness of aquatic biota among shareholders and provide advocacy on relevant issues.
- Further research on the impacts of water catchment management on these species.

- Monitor water quality.

Relevant governing bodies are the Inland Fisheries Service, DPIW and Hydro Tasmania. Hydro Tasmania is required by the *Water Management Act 1999* to take ecological considerations into account in the management of water resources. The Inland Fisheries Service is responsible for managing native aquatic fauna at Great Lake including the six crustaceans, and commitments to manage them are included in the IFS's *Great Lake Fishery Management Plan*. The Department of Primary Industries and Fisheries is responsible for the issuing or refusal of permits for actions that may impact on these species.

SOURCE MATERIAL

References

Davies, PE and Fulton, W (1987) History of the Great Lake Area; Invertebrate Fauna of Great Lake; Netting Surveys of Great Lake. *Inland Fisheries Commission Newsletter*. Vol 16, 12 pp.

Davies, PE and Cook, LSJ (2000) Great Lake Algal Bed Survey, Summer 1999/2000. Report to Hydro Tasmania. March 2000. Freshwater Systems, Hobart 21 pp.

Davies, PE (2001) Algal beds and threatened aquatic fauna in Great Lake: Current status, responses to lake level and management recommendations. Report to Hydro Tasmania. October 2000. Freshwater Systems, Hobart 52 pp.

Davies, PE (2002) Update on Status of Great Lake *Chara* beds. Report to Hydro Tasmania. April 2002. Freshwater Systems, Hobart 10 pp.

Fulton, W (1983a) Macrobenthic Fauna of Great Lake, Arthurs Lake and Lake Sorell, Tasmania *Australian Journal of Marine and Freshwater Research* **34**: 775-85.

Fulton, W (1983b) Variation in Macrobenthic Fauna of Tasmanian Lakes, *Australian Journal of Marine and Freshwater Research* **34**: 786-803.

Gooderham, J and Tsyrlin, E (2002) The Waterbug Book: a guide to the freshwater macroinvertebrates of temperate Australia. CSIRO Publishing.

Hydro Tasmania (2003) South Esk – Great Lake Water Management Review: Scientific Report on Great Lake. (Based on research undertaken by Freshwater Systems Pty Ltd).

Nicholls, G. E. (1943) The Phreatoicoidea. Part I. The Amphisopidae. *Papers and Proceedings of the Royal Society of Tasmania* **1942**, 1-145.

Nicholls, G. E. (1944) The Phreatoicoidea. Part II. The Phreatoicidae. *Papers and Proceedings of the Royal Society of Tasmania* **1943**, 1-156.

Williams, W.D. and Barnard, J. L. (1988) The taxonomy of crangonyctoid Amphipoda (Crustacea) from Australian fresh waters: foundation studies Records of the Australian Museum, Supplement 10.

Wilson, G. D. F. (2005) Southern Hemisphere Freshwater Isopods: Phreatoicidae

<http://www-personal.usyd.edu.au/~buz/phreamenu.html>

FURTHER INFORMATION

Specialist Advice

- Dr Peter Davies, Freshwater Systems Pty Ltd, University of Tasmania
- Inland Fisheries Service
- Dr George D.F. Wilson, Australian Museum.

Permit: It is an offence to kill, injure, collect or keep any of these species unless under permit from the Secretary, Department of Primary Industries and Water.

REVIEW AND FURTHER INFORMATION

Statement prepared: April 2006.

Prepared by: Kevin Bonham

Review date: When new information received.

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