

= Smooth toadfish =

The smooth toadfish ( *Tetractenos glaber* ) is a species of fish in the pufferfish family Tetraodontidae . It is native to shallow coastal and estuarine waters of southeastern Australia , where it is widespread and abundant . French naturalist Christophe @-@ Paulin de La Poix de Fréminville described the species in 1813 , though early records confused it with its close relative , the common toadfish ( *T. hamiltonii* ) . The two are the only members of the genus *Tetractenos* after going through several taxonomic changes since discovery .

Up to 16 cm ( 6 1 ? 4 in ) long with distinctive leopard @-@ like dark markings on its upperparts , it has a rounded front and tapers to a narrow tail at the back . Unlike most of its relatives , it does not have prominent spines on its body . Like other pufferfish , it can inflate itself with water or air . It forages for its preferred foods ? molluscs and crustaceans ? in sand and mud of the bottom sediment . Often an unwanted catch by anglers , the smooth toadfish is highly poisonous because of the tetrodotoxin present in its body , and eating it may result in death .

= = Taxonomy = =

French naturalist Christophe @-@ Paulin de La Poix de Fréminville described the smooth toadfish in 1813 as *Tetrodon glaber* , based on a specimen collected in Adventure Bay in southeastern Tasmania by Claude Riche . This holotype was then catalogued in the collection of French naturalist Alexandre Brongniart , but was subsequently lost ; upon his death , Brongniart 's collection was bequeathed to the Paris Museum and the specimen did not appear there nor at any other institution . The specific name *glaber* is from the Latin adjective *gl?ber* , meaning " bald " . Fréminville 's description was overlooked by many subsequent authorities , resulting in the confusion of this species with the closely related common toadfish ( *Tetractenos hamiltoni* ) ; it is unclear with many records which species was being referred to , though those from Victoria and Tasmania belong to this species . This issue in the scientific literature was not fully resolved until 1983 .

French naturalist Auguste Duméril erected a new genus in publishing the species as *Aphanacanthé reticulatus* in 1855 from a description authored by his countryman Gabriel Bibron , who had died suddenly , Later Latinised to *Aphanacanthus* , it was linked to a presumed type species *Tetrodon reticulatus* , from a manuscript by Bibron . In 1959 , Yseult Le Danois equated this species name to *Tetractenos hamiltoni* , but New Zealand zoologist Graham Hardy later reviewed the specimens labelled as *T. hamiltoni* and found that they should be assigned to *T. glaber* . The genus name *Aphanacanthé* ? not *Aphanacanthus* , as the original spelling takes priority ? would have taken precedence over the current genus name *Tetractenos* . However , it is a *nomen nudum* as it does not provide enough detail or information to diagnose or properly describe the species , since Duméril had only written a ( French ) translation of the genus name ? ?????? qui n? parait pas , ?????? , épine ( " with no thorns " ) .

British ichthyologist Charles Tate Regan described *Spheroides liosomus* in 1909 from specimens collected in Melbourne , Hobart , Flinders Island and Port Phillip . He noted its lack of spines compared with specimens of *Tetrodon hamiltonii* , and hence argued that it was a distinct and separate species . Australian biologist Gilbert Whitley equated Regan 's description with Fréminville 's original naming and gave it the combination *Spheroides glaber* in 1955 , and later *Gastrophysus glaber* in 1964 .

The smooth toadfish was assigned to the genera *Tetrodon* ( now *Tetraodon* ) and *Sphaeroides* , both of which became wastebasket taxa . The smooth toadfish was assigned to several other genera after it became clear that it fell outside a more restricted definition of *Tetr* ( *a* ) *odon* , including *Torquigener* . Recognising that the smooth and common toadfish were distinct enough from other species to warrant their own genus and that no valid genus name existed , Hardy reassigned the two species to the new genus *Tetractenos* in 1983 .

Common names include smooth toadfish , smooth toado , slimey toadfish or smooth blowie . Along with related toadfish species , the smooth toadfish is known in Australia as a " toadie " . Gaguni is a Tharawal name for toadfish in the Sydney region , the word recorded by William Dawes as ca @-@

gone in his 1791 diaries of the Sydney language .

#### = = Description = =

With a total adult length of anywhere from 3 to 16 cm ( 1 1 ? 8 ? 6 1 ? 4 in ) , the smooth toadfish has an elongate body with a rounded back and flattened belly . The body narrows posteriorly to the slender tail , and its fins are all elongate and rounded . The dorsal fin has 9 to 11 rays . The pectoral fin has 15 to 18 rays , the first of which is very short . It arises well below the level of the eye . The anal fin has 7 ? 9 rays and caudal fin has 11 . The smooth toadfish has a small mouth with thin lips at its apex and a tiny chin . The round eyes are adnate ( unable to rotate ) , their upper border is level with the profile of the back and the lower border is well above the mouth . In a slightly depressed area just in front of the eyes are two small nipple @-@ shaped structures ( papillae ) that are the nasal organs . The openings face to the rear of the fish and are closed by flaps attached to the walls closest to the fish 's midline . The first pharyngobranchial gill arch is elongated and narrow with many tiny teeth . The smooth toadfish has tiny spines that are entirely within the skin layer ; these run along its back from the nasal organs almost to the dorsal fin , and along its sides from the eye to the pectoral fin , and along its underparts from behind its mouth to its vent . The skin is smooth even when the fish is fully inflated . It swallows water or air via a flap in its throat to swell itself up .

The base colour of the upperparts is pale tan to yellow @-@ green , heavily marked with irregular brown spots in a reticulated pattern , and several broad dark brown bands , including ones between the eyes , between the pectoral fins and at the level of the dorsal fin . Reminiscent of a leopard 's spots , the reticulated pattern continues on the upper lateral side along the body of the fish , becoming silver @-@ white on the lower lateral parts . The chin and belly are white . The fins have a faint yellow @-@ orange tinge , more noticeably in the tail fin . Fieldwork in Sydney waters found females to be larger and heavier than males . Smooth toadfish grow steadily larger as they grow older , with one 16 cm ( 6 1 ? 4 in ) long individual calculated to be 13 years old from examination of its otoliths . Their gonads develop when they reach a total length of about 7 ? 8 cm ( 2 3 ? 4 ? 3 1 ? 8 in ) . The smooth toadfish can be distinguished from the otherwise similar common toadfish by its lack of spines and its larger- and bolder @-@ patterned markings on its upperparts .

#### = = Distribution and habitat = =

The smooth toadfish is found along Australia 's eastern and southeast coast , from Moreton Bay in southeastern Queensland to Port Lincoln in South Australia as well as Kangaroo Island and Tasmania . It is one of the most abundant fishes in the muddy areas of Port Philip Bay . It generally lives in shallow water less than 3 m ( 10 ft ) deep , often over mudflats in estuaries . In areas of seagrass beds , smooth toadfish are more commonly found in sand areas bordering on the seagrass patches . They are more commonly found in seagrass patches in water less than 1 @.@ 5 m ( 5 ft ) deep rather than deeper water of 3 @.@ 5 ? 6 m ( 11 ? 20 ft ) . A South Australian field study on wrack and associated fauna found that the smooth toadfish was associated with larger volumes and aggregations containing green algae .

Although its movements are poorly known , tagging patterns indicate that the smooth toadfish spends most of its life cycle and reproduces in estuaries . It can venture well into freshwater past brackish areas . In 1964 a school of toadfish were found in the Lang Lang River at the South Gippsland Highway ? 34 km ( 21 mi ) from Western Port Bay and well beyond tidal areas .

#### = = Conservation = =

Its large range , abundance and stable population mean the smooth toadfish is classified as Least Concern on the IUCN Red List . Although no decline in numbers has been recorded , the effects of disappearance of its habitat ? mangroves and seagrass beds ? is unknown .

## = = Breeding = =

The breeding habits of estuary @-@ dwelling pufferfish have been little researched in general . Fieldwork in the Hawkesbury River and tributaries north of Sydney found that the smooth toadfish breeds between April and July , building up fat stores in its liver from February to April beforehand .

## = = Feeding = =

The smooth toadfish has strong jaws that readily crush shellfish and crustaceans . It feeds predominantly on benthic ( bottom @-@ dwelling ) organisms in the substrate of the bodies of water in which it forages . Its diet includes molluscs such as black mussels , pipis , white sunset shells ( *Soletellina alba* ) and oysters ( *Crassostrea* ) , crustaceans such as semaphore crabs and shrimp , and brown algae . The proportions of crustaceans to molluscs can vary widely depending on the abundance of food items ; hence in a 1999 field study , the soldier crab ( *Mictyris longicarpus* ) predominated in Cowan Creek while the black mussel did so in nearby Berowra Creek . Field experiments showed it was a consumer of oysters and the gastropod *Bembicium auratum* , and had a major impact on their numbers .

Because it is a common estuarine fish , it has been used in studies of heavy metal contamination in coastal waters . Fish tested around Sydney showed uptake was highest in the gonads , then muscle , gills and liver . It is unclear why metal concentrations were lower in toadfish livers ( compared with studies of contamination in other fish ) but their liver cells may be more effective at removing these elements . Lead , cadmium and nickel levels corresponded with those in the sediment from which the fish were taken , suggesting dietary intake . The gonads of male fish had twenty times as much arsenic as those of females , while the gills of female fish contained thirty times as much lead as those of males . Raised levels of arsenic , cobalt , cadmium and lead in gills suggested the fish absorbed these from the surrounding water . An experiment exposing smooth toadfish to radioactive cadmium and selenium in either food or water found that cadmium in food was taken up in and excreted by the liver , while cadmium in water was taken up in the gut lining and excreted in liver , gills and kidney , indicating the fish were consuming a lot of water . Selenium was taken up in the gills , kidneys and liver regardless of whether it was in food or water . Fieldwork in Sydney waterways showed that higher arsenic , lead , cadmium and cobalt corresponded with decreased lipid levels in liver and gonadal tissue , and raised cobalt and nickel correspond to increased protein levels in muscle , liver and gonadal tissue . Raised lead levels were consistent with smaller egg size . A study of asymmetry of fish bones in smooth toadfish in various parts of Sydney and Hawkesbury River estuaries showed a relationship between exposure to organochlorine pesticides but not heavy metals , indicating the finding may correlate to stress from organic toxicity .

## = = Toxicity = =

Notorious for taking bait from fish hooks , the smooth toadfish is an unwanted catch for anglers as its flesh is highly poisonous and unfit for human consumption . Its lack of spines makes it easier to handle than other toadfish when it inflates itself after being caught . Its toxicity had been reported by local aborigines in Sydney to William Dawes in the late 18th century . A man named John Buff was fatally poisoned after catching and eating toadfish in Duck River in 1821 near Parramatta ; his case and subsequent coroner 's inquest were published in the Sydney Gazette . The smooth toadfish was responsible for the deaths of the wife and two children of Captain Bell of New Town near Hobart in a widely publicised case in March 1831 . Colonial surgeon James Scott wrote ,

" The melancholy and dreadful effect produced by eating it was lately instanced in the neighbourhood of Hobart town ... The poison is of a powerful sedative nature , producing stupor , loss of speech , deglutition , vision and the power of the voluntary muscles , and ultimately an entire deprivation of nervous power and death . "

An inquest into the deaths took place on 29 March 1831 . The family 's three servants , one of whom appeared to have been poisoned as well and was ill , were placed in custody separately to

stop them communicating with each other while the investigation proceeded . The jury replicated the effects by feeding the fish to ( and poisoning ) two cats . The jury learnt that the servant , Speed , had caught the 20 or so fish and taken them home to eat . A neighbour called out to him not to eat the fish as they were " no good " , but he took it as a joke . The inquest concluded with a finding of accidental death , with some deliberation over whether Speed should have been charged with manslaughter or even murder after hearing the warning . Warnings about toadfish were subsequently issued .

Its toxicity is due to tetrodotoxin , which is concentrated particularly in the liver , ovaries , intestines and skin . Many species of pufferfish bear this toxin , obtaining it from tetrodotoxin @-@ containing bacteria in their diet . Eating the fish can have fatal consequences . The symptoms of poisoning , which are predominantly neurological , include ataxia , in addition to numbness and / or paraesthesia ( tingling ) around the mouth , lips , and limb extremities . Cases of pets being poisoned have occurred when the fish have been left where they can eat them .