Couch's goby (*Gobius couchi*)

MarLIN – Marine Life Information Network
Biology and Sensitivity Key Information Review

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The Marine Life Information Network, Marine Biological Association of the United Kingdom.

Please note. This MarESA report is a dated version of the online review. Please refer to the website for the most up-to-date version [https://www.marlin.ac.uk/species/detail/1307]. All terms and the MarESA methodology are outlined on the website (https://www.marlin.ac.uk)

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***Gobius couchi* showing the membrane free rays on the upper pectoral fin.**
Photographer: Pamela Tompsett
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See online review for distribution map

Distribution data supplied by the Ocean Biogeographic Information System (OBIS). To interrogate UK data visit the NBN Atlas.

Researched by	Karen Riley	**Refereed by**	Prof. Robert Patzner
Authority	Miller & El-Tawil, 1974		
Other common names	-	**Synonyms**	-

Summary

Description

Gobius couchi is a typically shaped goby, reaching a maximum of 9 cm in length. It is fawn brown to grey in colour with dark markings on its back. There is a deeper-than-long dusky patch at the upper base of the pectoral fin and five dark lateral blotches. It is also found with one, or sometimes two dark spots on the cheeks. There are 35-45 rows of scales along the sides, from the pectoral fin to the tail fin.

Recorded distribution in Britain and Ireland

This species has only been recorded from four locations in the British Isles: Helford in south Cornwall; Bill of Portland, Dorset; Lough Hyne, Co. Cork, Ireland; and Mulroy Bay, Co. Donegal, Ireland.

Global distribution

Couch's goby has recently been recorded at Naples in the western Mediterranean and in the Adriatic Sea.

Habitat

Gobius couchi is found in the lower intertidal and inshore waters, under stones or algae on sheltered muddy sand.

Depth range

0.5 to 16 m

Identifying features

- Tail is flattened, deep and short.
- Upper rays of pectoral fin are free of membrane.
- Moderately well-developed membrane forms the front edge of pelvic disc, with no lobe present at either side.
- Relatively large scales.
- First dorsal fin is not higher than the second.
- It has 27-28 vertebrae.

Additional information

Couch's goby is a very localised, rare and protected species. It is found low shore under red or green algae in south Cornwall and north west Ireland, below high tide level in County Cork and sublittorally in a sheltered sea lough in south Ireland.

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Further information sources

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Biology review

Taxonomy

Phylum	Chordata	Sea squirts, fish, reptiles, birds and mammals
Class	Actinopterygii	Ray-finned fish, e.g. sturgeon, eels, fin fish, gobies, blennies, and seahorses
Order	Perciformes	
Family	Gobiidae	
Genus	Gobius	
Authority	Miller & El-Tawil, 1974	
Recent Synonyms	-	

Biology

Typical abundance	Low density
Male size range	up to 9cm
Male size at maturity	
Female size range	Small-medium(3-10cm)
Female size at maturity	
Growth form	Pisciform
Growth rate	
Body flexibility	High (greater than 45 degrees)
Mobility	
Characteristic feeding method	
Diet/food source	
Typically feeds on	Algae, crustaceans, bivalves and polychaetes.
Sociability	
Environmental position	Demersal
Dependency	Independent.
Supports	None
Is the species harmful?	No

Biology information

Gobius couchi is a rare British marine fish which feeds on algae, crustaceans, bivalves and polychaetes. It is known to reach a maximum of 9 cm in length and has a lifespan of approximately 6 years.

Habitat preferences

Physiographic preferences	Open coast, Enclosed coast / Embayment
Biological zone preferences	Sublittoral fringe
Substratum / habitat preferences	Fine clean sand, Maerl, Mixed, Mud, Muddy sand, Pebbles, Rockpools, Sandy mud, Under boulders

Tidal strength preferences	
Wave exposure preferences	Sheltered
Salinity preferences	See additional Information
Depth range	0.5 to 16 m
Other preferences	
Migration Pattern	Non-migratory / resident

Habitat Information

- *Gobius couchi* was discovered relatively recently, in 1974, and is considered to be a resident of three locations in the British Isles. However, it was recorded in 1998 in the western Mediterranean (Ischia Island, Naples, Italy) (Stefanni & Mazzoldi, 1999), and, more recently, in the Kvarner region of the Adriatic Sea (Kovacic, 2001) suggesting that the distribution of the species may be wider.
- Couch's goby occurs in fully saline water. Both Irish localities where the goby is found are sheltered and have reduced tidal ranges (Minchin, 1988). At Lough Hyne and Mulroy bay there are well-established populations. Couch's goby ranges in depth from 0.5 to 16 m at Lough Hyne and 3-14 m depths at Mulroy bay (Minchin, 1987). It tends to be found with stones in shallow water, boulders at greater depths and also with shell debris. *Gobius couchi* was noted to be the most dominant species present in some areas.
- Helford is a sheltered, land-locked habitat. In this environment *Gobius couchi* is normally associated with flat stones or muddy sand with shells and pebbles present (Minchin, 1988). They are also exposed at low water spring tides. Potts & Swaby (1991) observed that the population at this site has diminished over the last 10 years.
- The salinity preferences of *Gobius couchi* lie between 25-35 psu.

Life history

Adult characteristics

Reproductive type	Gonochoristic (dioecious)
Reproductive frequency	Annual protracted
Fecundity (number of eggs)	See additional information
Generation time	Insufficient information
Age at maturity	Insufficient information
Season	Spring - Summer
Life span	See additional information

Larval characteristics

Larval/propagule type	-
Larval/juvenile development	Oviparous
Duration of larval stage	No information
Larval dispersal potential	1 km -10 km
Larval settlement period	Insufficient information

Life history information

Gobius couchi has a lifespan of up to 6 years (Miller, 1986).
Very little information is available detailing the reproduction of *Gobius couchi*, but it is probable that this is fairly similar to that of other Gobiidae. For instance, *Gobius cobitis*, *Pomatoschistus microps*, and *Pomatoschistus minutus* usually produce 2 clutches of eggs each breeding season. Eggs are laid by the female and attached to the under-surface of large boulders or shells. The eggs are then fertilized and guarded by the male. Thus the eggs are protected and kept inshore until the feeding larvae hatch. The breeding season usually occurs in spring and early summer in Britain. Fecundity will probably vary between 2,000 and 12,000, within the same range as that of other *Gobiidae*.

Sensitivity review

This MarLIN sensitivity assessment has been superseded by the MarESA approach to sensitivity assessment. MarLIN assessments used an approach that has now been modified to reflect the most recent conservation imperatives and terminology and are due to be updated by 2016/17.

Physical Pressures

	Intolerance	Recoverability	Sensitivity	Confidence
Substratum Loss	Intermediate	High	Low	Moderate

Gobius couchi lives and forages on a variety of substrata. It requires rockpools in the intertidal to survive at low tide. Therefore, loss of rockpools (for instance, by infilling) or rocky substrata (for instance, by spoil dumping or land claim) will most likely cause a proportion of the species population to die. However, at high tide adults are sufficiently mobile and will be able to recolonize areas which contain suitable substrata. Intolerance to substratum loss is assessed as intermediate. Recoverability is likely to be high (see Additional Information section below).

Smothering	Intermediate	High	Low	Moderate

Gobius couchi will not be affected by smothering as they are mobile and able to swim away. However, destruction of habitat is important. Cordone & Kelley (1961) reported that (in a freshwater habitat) deposition of sediment on the bottom of the substratum would destroy needed shelter, reduce the availability of food, impair growth and lower the survival rate of eggs and larvae of fish. It is likely that *Gobius couchi* would be more intolerant if smothering occurred during the breeding season due to the probable destruction of broods of eggs. Materials such as concrete, oil or tar are likely to have a greater negative impact on the population. Intolerance due to smothering is assessed as intermediate. Recoverability is likely to be high (see Additional Information section below).

Increase in suspended sediment	Low	High	Low	Low

Moore (1977) indicated that an increase in siltation can have a negative effect on the growth of adult fish, survival of eggs and larvae and pathological effects on gill epithelia. Bottom-dwelling species are generally found to be tolerant of suspended solids (Moore, 1977). Juveniles have been reported as being more intolerant of siltation than adults (Moore, 1977). Therefore, intolerance has been recorded as low. Recoverability is likely to be high (see Additional Information section below).

Decrease in suspended sediment	Tolerant	Not relevant	Not sensitive	Moderate

Gobius couchi is likely to be tolerant of a decrease in suspended sediment.

Dessication	High	Moderate	Moderate	Moderate

Gobius couchi is found intertidally, in shallow rock pools. It can shelter in rock crevices and under boulders or weed, where the risk of desiccation is minimized. The animal is soft-bodied, so stranding of the individual, and subsequent exposure to sunshine and air for an hour would more than likely result in a proportion of the population dying. Intolerance to desiccation is therefore recorded as high. Recoverability is likely to be moderate (see Additional Information section below).

Increase in emergence regime	Tolerant	Not relevant	Not sensitive	Low

It is unlikely that *Gobius couchi* would be affected by a change in the emergence regime as at

high tide it forages near the shore and at low tide it inhabits rock pools.

Decrease in emergence regime Tolerant Not relevant Not sensitive Low

It is unlikely that *Gobius couchi* would be affected by a change in the emergence regime as at high tide it forages near the shore and at low tide it inhabits rock pools.

Increase in water flow rate Low Very high Very Low Low

The ability of *Gobius couchi* to shelter in crevices between large boulders would be able to shield them from a moderate increase in the water flow rate. However, it is unlikely that they could withstand a large increase in water flow rate, as this would decrease the goby's ability to forage. Intolerance is assessed as low. Recoverability is likely to be high (see Additional Information section below).

Decrease in water flow rate Tolerant Not relevant Not sensitive Not relevant

Gobius couchi is likely to be tolerant of a decrease in water flow rate.

Increase in temperature Not relevant

Insufficient information was available to assess the sensitivity of *Gobius couchi* to an increase in temperature.

Decrease in temperature Intermediate High Low Moderate

Temperature and oxygen levels change drastically over a tidal cycle in a rockpool. Couch's goby is capable of tolerating temperatures less than 6 °C by falling into a torpid state underneath stones (Minchin, 1988). By falling into this torpid state its ability to forage for food and reproduce is reduced.
The geographical distribution of *Gobius couchi* is restricted to the south-west of England and the Mediterranean Sea. A temperature decrease is likely to have an impact on *Gobius couchi*. During the severe winter period in 1962-63 the south-west coast of Britain experienced temperatures 5 and 6 °C below the long-term average for about 2 months. During this period there was heavy mortality of observed populations of *Gobius paganellus*, *Gobius minutus*, and *Gobius flavens* (Crisp (ed.), 1964). Therefore a decrease in temperature may affect populations in the British Isles, by either shifting the geographical distribution further southwards towards warmer waters, or killing a proportion of the northern-most population. Intolerance has been assessed as intermediate. Recoverability is likely to be high (see Additional Information section below).

Increase in turbidity Low High Low Moderate

An increase in turbidity would lead to a reduction in the amount of light penetration and, subsequently, a decrease in algal growth. Algae is the preferred food source of *Gobius couchi*, but other food sources (such as crustaceans and polychaetes) would still be readily available. The minimum light intensity needed for the detection and recognition of food are of great importance in many species of fish (Kinne, 1970). For instance if the organism needs to spend more time foraging for food, its energy expenditure will increase and could possibly lead to growth and reproductive problems. In heavily turbid waters fish larvae have been noted to show a greater than normal mortality. It is probable that *Gobius couchi* would be intolerant of changes in turbidity on a large scale, but probably not with changes of approximately 50 mg/l over a month. Therefore the species intolerance to turbidity is recorded as low. Recoverability is likely to be high (see Additional Information section below).

Decrease in turbidity Tolerant* Not relevant Not sensitive* Not relevant

Decreases in turbidity benefit algal growth and therefore more food (algae and associated

crustaceans) would be readily available. This would be beneficial to the population and tolerant* has been suggested.

Increase in wave exposure	Tolerant	Not relevant	Not sensitive	Low

Faria & Almada (1999) found that when rocky intertidal fish were removed or added to pools which had been disturbed by storms (which move large quantities of sand and reshape their contents) the negative effects on populations were variable. However, storms are an extreme event and couch's goby is sufficiently mobile and able to shelter in rock crevices or move to deeper water. Therefore, a change of two ranks on the wave exposure scale is unlikely to affect the goby.

Decrease in wave exposure	Tolerant	Not relevant	Not sensitive	Low

A reduction of two ranks on the wave exposure scale is unlikely to affect the goby.

Noise		Not relevant		Not relevant

Insufficient information.

Visual Presence	Low	High	Low	Low

Fish generally forage for food using visual methods and can detect differing levels of light and shade. It is therefore probable that *Gobius couchi* can also detect these changes and would be slightly affected by activity on the shore, more so in the breeding season. However, periods of time when activity might be reduced due to hiding would most likely be slight. Intolerance to visual presence is recorded as low. Recoverability is likely to be high (see Additional Information section below).

Abrasion & physical disturbance	Not relevant	Not relevant	Not relevant	Not relevant

Gobius couchi is sufficiently mobile to avoid abrasive contact and to shelter from it, therefore it is unlikely to suffer from abrasion.

Displacement	Low	High	Low	Moderate

If displaced onto other suitable substrata no effects on the population are expected. Faria & Almada (1999) reported that experiments on removal and addition of individuals of *Gobius cobitis* show that the number of fish in the pools return to normal after a few weeks. It is likely that this would follow for *Gobius couchi*. However, if this occurs during the breeding season negative effects could be noted. Furthermore, if a male that is protecting fertilized eggs is displaced, the eggs are not likely to survive. Therefore, a low intolerance has been recorded. Recoverability is likely to be high (see Additional Information section below).

Chemical Pressures

	Intolerance	Recoverability	Sensitivity	Confidence
Synthetic compound contamination	Intermediate	High	Low	Low

The population decline of *Gobius couchi* in the Helford area was suggested to possibly be due to TBT pollution (Potts & Swaby, 1991) or other man-made sources. Lindane is likely to bioaccumulate significantly and is considered to be highly toxic to fish (Cole *et al.*, 1999). Ebere & Akintonwa (1992) conducted experiments on the toxicity of various pesticides to *Gobius* sp. They found Lindane and Diazinon to be very toxic, with 96 hr LC_{50s} of 0.25 µg/l and 0.04 µg/l respectively. TBT is very toxic to algae and fish. However, toxicity of TBT is highly variable with 96-hr LC_{50} ranging from 1.5 to 36 µg/l, with larval stages being more intolerant than adults (Cole *et al.*, 1999). PCBs are highly persistent in the water column and sediments, have the potential to bioaccumulate significantly and can be very toxic to marine invertebrates.

However their toxicity to fish is not clear (Cole *et al.*, 1999). Therefore, an intermediate intolerance has been recorded. Recoverability is likely to be high (see Additional Information section below).

Heavy metal contamination High High Moderate Low

Cadmium, mercury, lead, zinc and copper are highly persistent, have the potential to bioaccumulate significantly and are all considered to be very toxic to fish (Cole *et al.*, 1999). Mueller (1979) found that in *Pomatoschistus* sp., a different species of goby, very low concentrations of cadmium, copper and lead (0.5 g/l Cd^{2+}; 5 g/l Cu^{2+}; 20 g/l Pb^{2+}) brought about changes in activity and an obstruction to the gill epithelia by mucus. This may also be true for *Gobius couchi*.
Inorganic mercury concentrations as low as 30 µg/l (96-h LC_{50}) are considered to be toxic to fish, whereas organic mercury concentrations are more toxic to marine organisms (World Health Organisation, 1989, 1991). Therefore, a high intolerance to heavy metals has been recorded. Recoverability is likely to be high (see Additional Section below).

Hydrocarbon contamination Intermediate High Low Low

Toxicity of low molecular weight poly-aromatic hydrocarbons (PAH) to organisms in the water column is moderate (Cole *et al.*, 1999). They have the potential to accumulate in sediments and, depending on individual PAH, to be toxic to sediment dwellers at levels between 6 and 150 µg/l (Cole *et al.*, 1999). The toxicity of oil and petrochemicals to fish ranges from moderate to high (Cole *et al.*, 1999). The main problem is due to smothering of the intertidal habitat. Bowling *et al.* (1983) found that anthracene, a PAH, had a photo-induced toxicity to the bluegill sunfish. In fact, they reported that when exposed to sunlight anthracene was at least 400 times more toxic than when no sunlight was present. According to Ankley *et al.* (1997) only a subset of PAH's are phototoxic (fluranthene, anthracene, pyrene etc.). Effects of these compounds are destruction of gill epithelia, erosion of skin layers, hypoxia and asphyxiation (Bowling *et al.*, 1983). It is possible that *Gobius couchi* could be similarly intolerant of hydrocarbons, however this is not known. An intermediate intolerance to hydrocarbons has been recorded. Recoverability is likely to be high (see Additional Information section below).

Radionuclide contamination Intermediate High Low Very low

Kinne (1984) reported that for the marine goby, *Chasmichthys glosus*, doses of as little as 100 rad (type not known) produced a readily observable response, causing severe damage to gonads of both males and females. The testes showed slightly greater intolerance. It is probable that *Gobius couchi* would respond similarly to sublethal irradiation at levels indicated above. Therefore an intermediate intolerance to radionuclides has been recorded. Recoverability is likely to be high (see Additional Information section below).

Changes in nutrient levels Low High Low Low

Higher nutrient levels may encourage the growth of algae such as *Ulva* spp., which is an important food source for *Gobius couchi*. In comparison, a decrease in nutrient levels may lead to a decrease in the availability of green algae. However, this is likely to exert a slight effect on the couch's goby as it is able to ingest other types of food (such as crustaceans and polychaetes). Therefore, a low intolerance to nutrients has been recorded. Recoverability is likely to be high (see Additional Information section below).

Increase in salinity Low High Low Very low

No information is available for salinity effects on Couch's goby. However they do inhabit a wide range of habitats, with varying salinities. This implies that they are able to adapt reasonably well to various salinities.

Decrease in salinity	Low	High	Low	

No information is available for salinity effects on Couch's goby. However they do inhabit a wide range of habitats, with varying salinities. This implies that they are able to adapt reasonably well to various salinities.

Changes in oxygenation	Low	High	Low	Very low

Temperature and oxygen levels change drastically over a tidal cycle in a rockpool. It is likely that *Gobius couchi* is adapted to these changes, but that a drastic long term decrease in oxygen levels would be expected to have a slight negative impact on the population. Oxygenation intolerance is assessed as low. Recoverability is likely to be high (see Additional Information section below).

Biological Pressures

	Intolerance	Recoverability	Sensitivity	Confidence
Introduction of microbial pathogens/parasites		Not relevant		Not relevant

Insufficient Information.

Introduction of non-native species	Tolerant	Not relevant	Not sensitive	Not relevant

No alien or non-native species are known to affect *Gobius couchi* in Britain and Ireland.

Extraction of this species	High	Moderate	Moderate	Low

Gobius couchi has a restricted distribution, and is a rare and protected species. Therefore extraction of this species would have a great impact on the population density and viability. Intolerance is recorded as high, and recoverability is recorded as moderate (see Additional Information section below).

Extraction of other species	Tolerant	Not relevant	Not sensitive	Not relevant

Gobius couchi is not known to depend on any other species. Therefore, it is likely to be not sensitive to the extraction of other species.

Additional information

Gobius couchi is reasonably long-lived (up to 6 years). By considering it's reproduction to be similar to that of the giant goby, *%Gobius cobitis%*, it probably usually breeds twice during the breeding season each year (spring to early summer) (Gibson, 1970). Fecundity depends upon size, is usually high (Gibson, 1970) and the larvae are long-lived (Gil *et al*., 1997).

Importance review

Policy/legislation

Wildlife & Countryside Act	Schedule 5, section 9
Features of Conservation Importance (England & Wales)	☑

Status

National (GB) importance	Not rare/scarce	**Global red list (IUCN) category**	-

Non-native

Native	-		
Origin	-	**Date Arrived**	Not relevant

Importance information

Couch's goby is protected under the Wildlife Countryside Act 1981, schedule 5. This means that the species is fully protected. You therefore cannot injure, kill or take it from the wild, possess it or control it and you may not disturb it in any other way.

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