Bean-like tellin (*Fabulina fabula*)

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

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A report from:
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/1631]. All terms and the MarESA methodology are outlined on the website (https://www.marlin.ac.uk)

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Fabulina fabula.
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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	Will Rayment	**Refereed by**	This information is not refereed.
Authority	(Gmelin, 1791)		
Other common names	-	**Synonyms**	*Tellina fabula* Gmelin, 1791, *Angulus fabula* (Gmelin, 1791)

Summary

Description
An elongate, oval, bivalved shell with one abruptly tapered end. The outside of the shell is sculptured with fine concentric lines and pronounced growth rings, and the right valve has wavy striations. The shell is white in colour with tinges of yellow or orange. *Fabulina fabula* grows up to 2 cm in length.

Recorded distribution in Britain and Ireland
Occurs on all British and Irish coasts.

Global distribution
Occurs from Norway and the Baltic Sea, south to the Iberian Peninsula, the Mediterranean Sea, Black Sea and Atlantic coast of Morocco.

Habitat
Fabulina fabula burrows in fine to medium sand and silty sand on the lower shore and in the shallow sublittoral. It burrows up to a depth of 10 cm and lies horizontally on its left valve, extending its inhalant siphon to the sediment surface.

Depth range
lower shore to 55 m

Identifying features

- Posterior end abruptly tapered and curved to right.
- Wavy striations on right valve run from dorsal anterior to ventral posterior margins.
- Slightly inequivalve; right valve a little more convex than left.
- Inequilateral; beaks just behind mid-line.
- Growth stages very clear.

Additional information
-none-

Listed by

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Biology review

Taxonomy

Phylum	Mollusca	Snails, slugs, mussels, cockles, clams & squid
Order	Cardiida	
Family	Tellinidae	
Genus	Fabulina	
Authority	(Gmelin, 1791)	
Recent Synonyms	Tellina fabula Gmelin, 1791Angulus fabula (Gmelin, 1791)	

Biology

Typical abundance	High density
Male size range	up to 20mm
Male size at maturity	10mm
Female size range	10mm
Female size at maturity	
Growth form	
Growth rate	See additional information
Body flexibility	None (less than 10 degrees)
Mobility	
Characteristic feeding method	
Diet/food source	
Typically feeds on	Phytoplankton, detritus
Sociability	
Environmental position	
Dependency	None.
Supports	Independent
Is the species harmful?	No information

Biology information

Abundance

Salzwedel (1979) studied a population of *Fabulina fabula* (studied as *Tellina fabula*) from the German Bight. Peak abundance (*ca* 2000 individuals/m) occurred in September following the main period of spatfall and then decreased to a minimum in February (*ca* 500 individuals/m), at which point settlement began to occur again. The mean annual abundance was approximately 1000 individuals/m. Lopez-Jamar *et al.* (1995) reported the mean abundance of *Fabulina fabula* (studied as *Tellina fabula*) from La Coruna Bay in NW Spain to be 897 individuals/m, with a maximum abundance of 1871/m. Warwick *et al.* (1978) studied the *Venus* community from very fine sand in Carmarthen Bay, Bristol Channel. They reported *Fabulina fabula* (studied as *Tellina fabula*) densities of 80 individuals/m and biomass of 340 mg/m.

Size at maturity

Salzwedel (1979) reported the smallest specimen with recognizable sex to be 7.7 mm long, but that typically the gonads were not fully developed until shell length had reached 10 mm.

Growth rate

Growth rate of *Fabulina fabula* appears to be highly dependent on environmental conditions. Withers (1977) recorded spatfall of *Fabulina fabula* (studied as *Tellina fabula*) at Oxwich in Wales. 14 months after settlement, individuals had grown to lengths between 5.5 mm and 11 mm. However, growth may not be so rapid and Muus (1973) described *Fabulina fabula* from Øresund as attaining lengths of 3-4.5 mm after 21 months. Under laboratory conditions, Salzwedel (1979) recorded maximum growth of *Fabulina fabula* (studied as *Tellina fabula*) to be 10.3 mm in one year or 15.7 mg of dry tissue weight. Mean daily growth over the course of a year was a 0.40% increase in shell length. Salzwedel (1979) also noted 3 annual minima in growth rates which corresponded with the growth rings on the outside of the shell.

Feeding

Fabulina fabula is capable of both suspension feeding and deposit feeding. Salzwedel (1979) observed feeding behaviour in the laboratory. While suspension feeding, the inhalant siphon is held a few mm above the sediment surface and sucks in suspended particles. While deposit feeding, the inhalant siphon is bent over toward the sediment surface, sucking up detritus and sand grains more or less unselectively. Salzwedel (1979) made the suggestion that *Fabulina fabula* is solely a suspension feeder up until the age of 1.5 yr., after which it changes between feeding methods according to environmental conditions. Whilst in the laboratory, the species was fed on a mixed culture of the unicellular green alga *Dunaliella marina* and the diatom *Phaeodactylum tricornutum*.

Habitat preferences

Physiographic preferences	Open coast, Offshore seabed, Enclosed coast / Embayment
Biological zone preferences	Lower circalittoral, Lower eulittoral, Lower infralittoral, Mid eulittoral, Sublittoral fringe, Upper circalittoral, Upper infralittoral
Substratum / habitat preferences	Fine clean sand, Muddy sand
Tidal strength preferences	Moderately Strong 1 to 3 knots (0.5-1.5 m/sec.), Strong 3 to 6 knots (1.5-3 m/sec.), Weak < 1 knot (<0.5 m/sec.)
Wave exposure preferences	Exposed, Moderately exposed, Sheltered, Very exposed
Salinity preferences	Full (30-40 psu), Variable (18-40 psu)
Depth range	lower shore to 55 m
Other preferences	
Migration Pattern	Non-migratory / resident

Habitat Information

-

Life history

Adult characteristics

Reproductive type	Gonochoristic (dioecious)
Reproductive frequency	Annual protracted

Fecundity (number of eggs)	No information
Generation time	1-2 years
Age at maturity	See additional information
Season	March - September
Life span	2-5 years

Larval characteristics

Larval/propagule type	-
Larval/juvenile development	Planktotrophic
Duration of larval stage	See additional information
Larval dispersal potential	Greater than 10 km
Larval settlement period	

Life history information

Salzwedel (1979) observed the reproductive cycle of a population of *Fabulina fabula* (studied as *Tellina fabula*) from the German Bight. The first spawning occurred in March and the first spatfall occurred in April/May. The main spawning period was in July/August with the peak in spatfall being between July and September. Individuals that spawned in March also spawned again later in the year, whilst individuals that spawned for the first time in the summer spawned only once in the year. Spawning resulted in a mean weight loss of 23%.

Development after settlement appears to be highly dependent on environmental conditions. Withers (1977) recorded spatfall of *Fabulina fabula* (studied as *Tellina fabula*) at Oxwich in Wales. 14 months after settlement, individuals had grown to lengths between 5.5 mm and 11 mm. In contrast, post settlement individuals from the Øresund took 21 months to reach 3-4.5 mm in length (Muus, 1973). Salzwedel (1979) reported that *Fabulina fabula* reached maturity at a shell length of 10 mm. Given the above growth rates, it would appear that maturity could be reached in one year for fast growing individuals in warmer climates but may take 2 years or more for populations in colder water.

Salzwedel (1979) reported annual mortality of *Fabulina fabula* of 41% in the laboratory versus 82-96% *in situ*. The difference was attributed to the impacts of predation and substratum erosion in the natural environment.

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	High	High	Moderate	High

Fabulina fabula lives infaunally in sandy sediments. Removal of the substratum would also remove the entire population of the species and so intolerance is assessed as high. Recoverability is recorded as high (see additional information below).

Smothering	Low	Immediate	Not sensitive	Low

Fabulina fabula is a shallow burrower in sandy sediments. It requires its inhalant siphon to be above the sediment surface for feeding and respiration. Smothering with 5 cm of sediment would temporarily halt feeding and respiration and require the species to relocate to its preferred depth. *Fabulina fabula* is an active burrower (Salzwedel, 1979) and would be expected to relocate with no mortality. However, growth and reproduction may be compromised and so intolerance is assessed as low. Growth and reproduction would return to normal following relocation so recoverability is recorded as immediate.

Increase in suspended sediment	Tolerant*	Not relevant	Not sensitive*	Low

Levels of suspended sediment are likely to be most relevant to feeding. *Fabulina fabula* is known to practice two alternative modes of feeding. It either holds its feeding organ, the inhalant siphon, at a fixed position just above the sediment surface to filter out food particles suspended in the overlying water or else extends and moves its siphon around on the sediment above it to vacuum up deposited food particles (Salzwedel, 1979). The alternative feeding methods are likely to make the species insensitive to changes in suspended sediment. If the level of suspended sediment becomes so high as to risk clogging the feeding structures, *Fabulina fabula* could presumably switch to deposit feeding. Furthermore, an increase in suspended sediment is likely to increase the rate of siltation and therefore the food available to deposit feeders. *Fabulina fabula* is therefore assessed as 'tolerant' with the potential for growth and reproduction to be enhanced by the increased food supply.

Decrease in suspended sediment	Low	Very high	Very Low	Low

Fabulina fabula is known to practice two alternative modes of feeding. It either holds its feeding organ, the inhalant siphon, at a fixed position just above the sediment surface to filter out food particles suspended in the overlying water or else extends and moves its siphon around on the sediment above it to vacuum up deposited food particles (Salzwedel, 1979). A decrease in suspended sediment is likely to decrease the availability of food for both suspension feeders and deposit feeders. The reduction in food availability may result in less energy available for growth and reproduction by *Fabulina fabula*. However, the benchmark change period is one month, during which time it is not expected that mortality would occur and so intolerance is assessed as low. When suspended sediment returns to original levels, growth and reproduction should quickly return to normal so recoverability is assessed as very high.

Dessication Low Very high Very Low Low

Fabulina fabula lives infaunally in fine sand and silty sand (Tebble, 1976) and is therefore likely to be largely protected from desiccation stress. Additionally, bivalves are able to respond to desiccation stress by valve adduction during periods of emersion. It is likely that *Fabulina fabula* would be able to retain enough water within its shell to avoid mortality during the benchmark emersion period of one hour. However, during the period of emersion, the species would not be able to feed and respiration would be compromised, so there is likely to be some energetic cost. Intolerance is therefore recorded as low. On immersion, metabolic activity should quickly return to normal and recoverability is therefore recorded as very high.

Increase in emergence regime Intermediate High Low Low

Although a largely subtidal species, a proportion of the population of *Fabulina fabula* occurs on the lower shore and so is vulnerable to an increase in emergence. The species does not colonize further up the shore and therefore must be limited by one or more factors including desiccation, temperature and wave exposure. For example, Wilson (1978) noted that the predominantly subtidal *Fabulina fabula* had a much lower thermal tolerance than the predominantly intertidal *Tellina tenuis*. It is unclear whether *Fabulina fabula* is able to migrate downshore. For the purposes of this review, it is assumed that downshore migration does not occur. The benchmark for emergence is an increase in exposure for one hour every tidal cycle for a year. During this time, exposed individuals will not be able to feed, respiration will be compromised and thermal stress may occur. Over the course of a year, it is expected that the resultant energetic cost to the individuals highest up the shore will lead to some mortality. Intolerance is therefore assessed as intermediate. Recoverability is recorded as high (see additional information below).

Decrease in emergence regime Tolerant Not relevant Not sensitive High

Fabulina fabula thrives in the subtidal zone and would therefore could potentially benefit from a decrease in emergence. It is possible that a decreased emergence regime would allow the species to colonize further up the shore.

Increase in water flow rate Intermediate High Low Low

Fabulina fabula typically occurs in areas of 'moderately strong' water flow (Salzwedel, 1979; Diaz-Castaneda *et al.*, 1989). The benchmark increase would be to 'very strong' flow for one year (see glossary). The increased water flow rate would change the sediment characteristics in which the species lives, primarily by re-suspending and preventing deposition of finer particles (Hiscock, 1983). This would result in erosion of the preferred habitat. Additionally, the increased water flow rate may interfere with feeding and respiration. It is likely that some mortality would result and so intolerance is assessed as intermediate. Recoverability is recorded as high (see additional information below).

Decrease in water flow rate Intermediate High Low Low

Fabulina fabula typically occurs in areas of 'moderately strong' water flow (Salzwedel, 1979; Diaz-Castaneda *et al.*, 1989). The benchmark decrease would be to 'very weak' flow for one year (see glossary). Decreased water movement would result in increased deposition of fine suspended sediment (Hiscock, 1983), changing the sediment characteristics of the habitat in which the species lives. Over the course of a year, it is likely that species which favour stable, fine sediment communities would proliferate at the expense of species such as *Fabulina fabula* which are tolerant of more dynamic environments. Some mortality is therefore expected and an intolerance of intermediate is recorded. Recoverability is assessed as high (see additional information below).

Increase in temperature Low Very high Very Low High

Fabulina fabula has a wide geographic range, occurring from Norway to Morocco. It is likely therefore to be tolerant of higher temperatures than it experiences in Britain and Ireland. Wilson (1978) reported the 24 hour LT_{50} for *Fabulina fabula* (studied as *Tellina fabula*) from Millport in Scotland to be 26.5°C and noted that acclimation to higher temperatures enhanced the species' ability to withstand higher experimental temperatures. Similarly, Ansell *et al.* (1980) reported the 24 hour LT_{50} for *Fabulina fabula* (studied as *Tellina fabula* and acclimated at 10°C) from Millport to be 27°C. The 96 hour LT_{50} was 24-27°C depending on acclimation temperature. Growth experiments by Salzwedel (1979) revealed that growth of *Fabulina fabula* (studied as *Tellina fabula*) correlated positively with temperature up to about 16°C after which temperature increase inhibited growth. Considering that maximum sea surface temperatures around the British Isles rarely exceed 20°C (Hiscock, 1998), it is unlikely that *Fabulina fabula* would suffer mortality due to the benchmark increase in temperature. However, elevated temperatures would probably result in inhibition of growth and hence intolerance is recorded as low. Growth should quickly return to normal when temperatures return to their original levels so recoverability is assessed as very high.

Decrease in temperature Low Very high Very Low High

Fabulina fabula has a wide geographic range, occurring from Norway to Morocco. It is likely therefore to be tolerant of lower temperatures than it experiences in Britain and Ireland. Salzwedel (1979) reported that a population of *Fabulina fabula* from the German Bight (studied as *Tellina fabula*) experienced seasonal temperature fluctuations between 3°C and 16°C. It was noted that minimal growth occurred at 3°C. Further north in the species range it is expected that even lower winter temperatures would be experienced. Minimum surface seawater temperatures rarely fall below 5°C around the British Isles so it is unlikely that the benchmark decrease in temperature would cause mortality of *Fabulina fabula*. However, growth is likely to be inhibited and so intolerance is assessed as low. Growth should quickly return to normal when temperatures return to their original levels so recoverability is assessed as very high.

Increase in turbidity Low Very high Very Low Low

Fabulina fabula does not require light and therefore the effects of increased turbidity on light attenuation are not directly relevant. An increase in turbidity may affect primary production in the water column and therefore reduce the availability of phytoplankton food. However, phytoplankton will also immigrate from distant areas and so the effect may be decreased. As the turbidity increase only persists for a year, decreased food availability would probably only affect growth and fecundity and an intolerance of low is recorded. As soon as light levels return to normal, primary production will increase and hence recoverability is recorded as very high.

Decrease in turbidity Tolerant* Not relevant Not sensitive* Low

Fabulina fabula does not require light and therefore the effects of increased turbidity on light attenuation are not directly relevant. It is possible that decreased turbidity would increase primary production in the water column and by micro-phyto benthos. The resultant increase in food availability may enhance growth and reproduction in *Fabulina fabula*, but only if food was previously limiting.

Increase in wave exposure Intermediate High Low Low

Fabulina fabula occurs in very exposed habitats, such as the Dogger Bank in the North Sea (Kröncke, 1990), through to sheltered areas, including harbours (Diaz-Castaneda *et al.*, 1989). This suggests that the species would be tolerant of a certain degree of sediment mobility

associated with strong wave action. An increase in wave exposure of 2 categories for 1 year would place the majority of the population in areas frequently subject to strong wave action and the species may be affected in several ways. Strong wave action may cause damage or withdrawal of the siphons, resulting in loss of feeding opportunities and compromised growth. Furthermore, individuals may be dislodged by scouring from sand and gravel mobilized by increased wave action. During winter gales along the North Wales coast, large numbers of *Abra alba* were cast ashore and over winter survival rate was as low as 7% in the more exposed locations (Rees *et al*., 1977). For the above reasons, some mortality would be likely to occur and intolerance is recorded as intermediate. Recoverability is recorded as high (see additional information below). Bosselmann (1989) noted that *Fabulina fabula* has a high potential for mass development and heavy spatfalls which enables the species to recover from disturbances to the adult population.

Decrease in wave exposure Low Very high Very Low Low

Fabulina fabula occurs in very exposed habitats, such as the Dogger Bank in the North Sea (Kröncke, 1990), through to sheltered areas, including harbours (Diaz-Castaneda *et al*., 1989). Decreased wave exposure over the course of a year is likely to result in the establishment of more stable, finer sediment habitats. It is unlikely that this would result in mortality of *Fabulina fabula*, although it would probably suffer increased competition from species better adapted to life in low energy environments. Intolerance is therefore assessed as low. Recoverability is recorded as very high.

Noise Tolerant Not relevant Not sensitive Low

No information was found concerning the intolerance of *Fabulina fabula* to noise. The siphons are likely to detect vibrations and are probably withdrawn as a predator avoidance mechanism, but the species is not expected to be sensitive at the level of the benchmark.

Visual Presence Tolerant Not relevant Not sensitive Low

No information was found concerning the intolerance of *Fabulina fabula* to visual disturbance. It is not a visual species and is not likely to be sensitive.

Abrasion & physical disturbance Intermediate High Low Low

Despite their robust body form, bivalves are vulnerable to physical abrasion. For example, as a result of dredging activity, mortality and shell damage has been reported in *Mya arenaria* and *Cerastoderma edule* (Cotter *et al*., 1997). However, *Fabulina fabula* is a shallow burrower and has a fragile shell (Fish & Fish, 1996) and may be damaged by such an impact with fishing gear so intolerance is recorded as intermediate. Recoverability is assessed as high (see additional information below).

Displacement Intermediate High Low Low

Fabulina fabula burrows into the sediment within a few minutes when displaced to the surface of sandy substrata (Salzwedel, 1979). The species is therefore likely to be not sensitive to displacement *per se*. However, exposure at the sediment surface would increase the risk of predation, for example by the starfish *Astropecten irregularis* (Aberkali & Trueman, 1985), and so intolerance is assessed as intermediate. Recoverability is recorded as very high (see additional information below).

Chemical Pressures

	Intolerance	Recoverability	Sensitivity	Confidence
Synthetic compound contamination	High	High	Moderate	Moderate

No information was found concerning the effects of synthetic chemicals specifically on *Fabulina fabula*. However, inference can be drawn from related species. Beaumont *et al.* (1989) concluded that bivalves are particularly sensitive to tri-butyl tin (TBT), the toxic component of many antifouling paints. For example, when exposed to 1-3 µg TBT/l, *Cerastoderma edule* and *Scobicularia plana* suffered 100% mortality after 2 weeks and 10 weeks respectively. There is also evidence that TBT causes recruitment failure in bivalves, either due to reproductive failure or larval mortality (Bryan & Gibbs, 1991). Stirling (1975) investigated the effects of phenol, a non-persistent, semi-synthetic organic pollutant, on *Tellina tenuis*. Exposure to phenol produced a measurable effect on burrowing at all concentrations tested, i.e. 50 mg/l and stronger. Sub-lethal effects of exposure to phenol included delayed burrowing and valve adduction to exclude the pollutant from the mantle cavity. After exposure to 100 mg/l for 24 hours, the majority of animals were extended from their shells and unresponsive to tactile stimulation. Following replacement of the phenol solution with clean seawater, good recovery was exhibited after 2 days for animals exposed to 50 mg/l and some recovery occurred after 4 days for animals exposed to 100 mg/l.
In light of the intolerance of other bivalve species, intolerance of *Fabulina fabula* to synthetic chemicals is assessed as high. Recoverability is recorded as high (see additional information below).

Heavy metal contamination Intermediate High Low Moderate

The capacity of bivalves to accumulate heavy metals in their tissues, far in excess of environmental levels, is well known. Reactions to sub-lethal levels of heavy metal stressors include siphon retraction, valve closure, inhibition of byssal thread production, disruption of burrowing behaviour, inhibition of respiration, inhibition of filtration rate, inhibition of protein synthesis and suppressed growth (see review by Aberkali & Trueman, 1985). No evidence was found directly relating to *Fabulina fabula*. However, inferences may be drawn from studies of a closely related species. Stirling (1975) investigated the effect of exposure to copper on *Tellina tenuis*. The 96 hour LC_{50} for Cu was 1000 µg/l. Exposure to Cu concentrations of 250 µg/l and above inhibited burrowing behaviour and would presumably result in greater vulnerability to predators. Following replacement of copper solutions with clean seawater, *Tellina tenuis* showed little recovery of burrowing ability, either because residual copper in the sand acted as a deterrent or previous exposure had a deleterious metabolic effect. For reference to polluted UK sediments, copper concentration in the interstitial water of Restronguet Creek sediments has been measured at 100 µg/l (Bryan & Langston, 1992). The lethal and sublethal effects of copper exposure on *Tellina tenuis* suggest that *Fabulina fabula* would also be affected and intolerance is assessed as intermediate. Recoverability is recorded as high (see additional information below) but would be partially dependent on the persistence time of heavy metals in the sediments.

Hydrocarbon contamination Intermediate Moderate Moderate High

Suchanek (1993) reviewed the effects of oil on bivalves. Sublethal concentrations may produce substantially reduced feeding rates and/or food detection ability, probably due to ciliary inhibition. Respiration rates have increased at low concentrations and decreased at high concentrations. Generally, contact with oil causes an increase in energy expenditure and a decrease in feeding rate, resulting in less energy available for growth and reproduction. Sublethal concentrations of hydrocarbons also reduce infaunal burrowing rates. Conan (1982) studied the long term effects of the *Amoco Cadiz* oil spill in France. The delayed mortality effects on sand and mud biota were estimated to be 1.4 times larger than the immediate effects. At St Efflam Beach, *Fabulina fabula* (studied as *Tellina fabula*) started to disappear from the intertidal zone a few months after the spill and from then on was restricted to the subtidal.

In the following 2 years, recruitment of *Fabulina fabula* was very much reduced. Intolerance is assessed as intermediate as the majority of the *Fabulina fabula* population lives subtidally and would therefore avoid the impact of an oil spill. Recoverability would be delayed by the persistence of oil in sediments, as was demonstrated by the inhibition of recruitment, and so is assessed as moderate.

Radionuclide contamination Not relevant

No information was found concerning the effects of radionuclide contamination on *Fabulina fabula*.

Changes in nutrient levels Intermediate High Low Low

No information regarding the direct effects of nutrients on *Fabulina fabula* was found. However, increased nutrients are likely to enhance ephemeral algal and phytoplankton growth, increase organic material deposition and enhance bacterial growth. At low levels, an increase in phytoplankton and benthic diatoms may increase food availability for *Fabulina fabula*, thus enhancing growth and reproductive potential. However, increased levels of nutrient (beyond the carrying capacity of the environment) may result in eutrophication, algal blooms and concomitant reductions in oxygen concentrations (e.g. Rosenberg & Loo, 1988). Rosenberg & Loo (1988) reported mass mortalities of the bivalves *Mya arenaria* and *Cerastoderma edule* following a eutrophication event in Sweden, although no direct causal link was established. It is likely therefore that a dramatic increase in nutrient levels would cause some mortality of *Fabulina fabula* and so an intolerance of intermediate is recorded. Recoverability is recorded as high (see additional information below).

Increase in salinity Tolerant Not relevant Not sensitive High

Fabulina fabula is typically found in full salinity conditions (Salzwedel, 1979; Diaz-Castaneda *et al.*, 1989) and is therefore probably relatively tolerant of further increases in salinity. No information was found concerning the effects of hypersaline conditions on *Fabulina fabula*.

Decrease in salinity Intermediate High Low Low

Fabulina fabula is typically found in full salinity conditions (Salzwedel, 1979; Diaz-Castaneda *et al.*, 1989) and is therefore likely to be intolerant of reductions in salinity in some way. Salzwedel (1979) reported that the species does occur in variable salinity conditions (down to 20 psu) but that growth is inhibited. The benchmark decrease in salinity would place the population in areas of variable salinity for one year or reduced salinity for one week. The change would be likely to cause inhibition of growth and reproduction and exposure to low salinity may result in some mortality. Intolerance is therefore assessed as intermediate. Recoverability is recorded as high (see additional information below).

Changes in oxygenation Intermediate High Low Low

Fabulina fabula is an aerobic organism and therefore will be intolerant in some degree to lack of oxygen. No evidence was found for specific effects of reduced oxygenation on *Fabulina fabula* but inferences can be drawn from the effects on other species. Jorgensen (1980) recorded the effects of low oxygen levels on benthic fauna in a Danish fjord. At dissolved oxygen concentrations of 0.2-1.0 mg/l the bivalves, *Cerastoderma edule* and *Mya arenaria*, suffered mortality between 2 and 7 days. Rosenberg & Loo (1988) reported mass mortalities of *Mya arenaria* and *Cerastoderma edule* in Sweden, following a eutrophication event which resulted in low oxygen concentrations over several years (often < 1 ml O_2/l). At the benchmark level of exposure (2 mg/l for one week) it is expected that some mortality of *Fabulina fabula* would occur and an intolerance of intermediate is recorded. Recoverability is recorded as high (see additional information below).

Biological Pressures

	Intolerance	Recoverability	Sensitivity	Confidence
Introduction of microbial pathogens/parasites	Intermediate	High	Low	Low

Individuals of *Fabulina fabula* from Boulogne-sur-Mer (studied as *Angulus fabula*) were infected with the trematode parasite *Gymnophallus strigatus*, causing erosion of the shell (Giard, 1897, cited in Kinne, 1983). No indication of the possible effects of the infection were given, but it would be likely to increase mortality through shell weakening and so an intolerance of intermediate is recorded. Recoverability is assessed as high (see additional information below).

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

There is no evidence to suggest that *Fabulina fabula* is likely to be intolerant of displacement by non-native species.

Extraction of this species	Not relevant	Not relevant	Not relevant	Not relevant

No evidence was found concerning the targeted extraction of *Fabulina fabula*.

Extraction of other species	Not relevant

No information was found concerning the effects of extraction of other species on *Fabulina fabula*. The species is potentially at risk from fishing activities on sandy substrata, e.g. beam trawling for flatfish, and extraction of sand by the aggregate industry (Eno, 1991).

Additional information

The life history characteristics of *Fabulina fabula* contribute to its strong powers of recoverability. *Fabulina fabula* spawns at least once a year and has a protracted breeding period (Salzwedel, 1979). No information was found concerning number of gametes produced, but the number is likely to be high as with other bivalves exhibiting planktotrophic development (Olafsson *et al.*, 1994). Timing of spawning and settlement suggests that the larval phase lasts at least a month (Salzwedel, 1979), and therefore the species has high dispersal potential. However, post settlement development is not particularly rapid and the species may take 2 or more years to mature, particularly in colder waters at the limit of its range (Muus, 1973).

Bosselmann (1988) concluded that *Fabulina fabula* was among a group of species with high potential for dense settlement in the German Bight as larvae were found in large numbers in the water column and the prolonged reproductive period enabled rapid settling following environmental change. Bosselmann (1991) conducted colonization experiments in an offshore subtidal region of the German Bight. Sediment containers exposed in April were heavily settled by *Fabulina fabula* in July. Spat had grown to a length of 3.2 mm after 1 year, suggesting that maturity would not be reached until the second summer after colonization. The author proposed that relatively slow growing species, such as *Fabulina fabula*, were not well adapted to opportunistic colonization of new sediments. This conclusion was supported by colonization experiments conducted by Diaz-Castaneda *et al.* (1989) in Dunkerque harbour. Defaunated sediments were colonized by *Fabulina fabula* at the end of the successional sequence. It was suggested that *Fabulina fabula* is an equilibrium species with a long life span for which successful spatfall is not an annual event. This does not make the species a particularly effective colonizer relative to opportunists like polychaete worms, but, due its low death rate, ensures that the species is persistent once established.

The experimental data suggest that *Fabulina fabula* would colonize available sediments in the year following environmental perturbation, but that a breeding population may take 2 or more years to

establish. It is expected that full recovery would occur within 5 years and so recoverability is assessed as high.

Importance review

Policy/legislation

- no data -

Status

National (GB) importance	-	**Global red list (IUCN) category**	-

Non-native

Native	-		
Origin	-	**Date Arrived**	-

Importance information

Salzwedel (1979) reported that *Fabulina fabula* is preyed upon by the boring gastropod, *Lunatia intermedia*, and Aberkali & Trueman (1985) reported predation by the starfish *Astropecten irregularis*.

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