MarLIN
Marine Information Network
Information on the species and habitats around the coasts and sea of the British Isles

A tubeworm (*Owenia fusiformis*)

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

Ken Neal & Penny Avant

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***Owenia fusiformis*.**
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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	Ken Neal & Penny Avant	**Refereed by**	This information is not refereed.
Authority	Delle Chiaje, 1844		
Other common names	-	**Synonyms**	-

Summary

Description

Owenia fusiformis is a thin, cylindrical, segmented worm, up to 10 cm long, that lives in a tough flexible tube buried in the sand with its anterior end just protruding from the surface. The tube is composed of sand grains or shell fragments glued together in an overlapping fashion. The body of the worm is greenish or yellowish and at the head end the mouth is surrounded by short, reddish, frilly lobes.

Recorded distribution in Britain and Ireland

Widespread around British and Irish coasts.

Global distribution

Widely distributed in coastal regions throughout northwest Europe, the Mediterranean, the Indian Ocean and the Pacific.

Habitat

Found buried in sand or muddy sand, at or below low water, on fairly sheltered beaches.

Depth range

found from the intertidal down to 4,500 m

Identifying features

- A slender tube-dwelling worm up to 10 cm in length.
- Head region with tentacular crown.
- Tube typically with shell fragments arranged like roof tiles.
- Tubes may be so numerous that they bind the sand together, although many may be empty.
- The worm is thin and yellowish or greenish in colour, with small, reddish, frilly lobes at the head end.

Additional information

No text entered

Listed by

Further information sources

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Biology review

Taxonomy

Phylum	Annelida	Segmented worms e.g. ragworms, tubeworms, fanworms and spoon worms
Class	Polychaeta	Bristleworms, e.g. ragworms, scaleworms, paddleworms, fanworms, tubeworms and spoon worms
Order	Sabellida	
Family	Oweniidae	
Genus	Owenia	
Authority	Delle Chiaje, 1844	
Recent Synonyms	-	

Biology

Typical abundance	High density
Male size range	30 - 100mm
Male size at maturity	24 - 60mm
Female size range	24 - 60mm
Female size at maturity	
Growth form	Vermiform segmented
Growth rate	See additional information.
Body flexibility	High (greater than 45 degrees)
Mobility	
Characteristic feeding method	Active suspension feeder, Surface deposit feeder
Diet/food source	Planktotroph
Typically feeds on	Phytoplankton and particulate organic matter.
Sociability	
Environmental position	Infaunal
Dependency	No information found.
Supports	No information
Is the species harmful?	No

Biology information

Owenia fusiformis can suspension feed by ciliary filter feeding or in low water flow can deposit feed by bending their flexible tube over so that the feeding crown touches the sediment surface (Rouse & Pleijel, 2001). This polychaete has a lifespan of up to four years in British waters (Rouse & Pleijel, 2001) and has a polymodal population structure of three to five year classes (Menard *et al*., 1990). The mortality rate increases gradually with age but suddenly increases in the fourth year of life (Menard *et al*., 1990). Growth is rapid in summer, slows in the autumn and is negligible in winter, resuming in April each year. The maximum recorded density was 4660 individuals per m^2 but this fluctuated over each year with mortality and massive larval settlement (Menard *et al*., 1990).

Habitat preferences

Physiographic preferences	Open coast, Offshore seabed, Estuary
Biological zone preferences	Bathybenthic (Bathyal), Lower eulittoral, Mid eulittoral, Sublittoral fringe
Substratum / habitat preferences	Fine clean sand, Muddy sand, Sandy mud
Tidal strength preferences	Weak < 1 knot (<0.5 m/sec.)
Wave exposure preferences	
Salinity preferences	Full (30-40 psu), Variable (18-40 psu)
Depth range	found from the intertidal down to 4,500 m
Other preferences	No text entered
Migration Pattern	Non-migratory / resident

Habitat Information

The cosmopolitan nature of *Owenia fusiformis* has been questioned by Koh & Bhaud (2001) who suggest a review of the Oweniidae because its taxonomy is now very old and more than one species may be included in *Owenia fusiformis* records.

Life history

Adult characteristics

Reproductive type	Gonochoristic (dioecious)
Reproductive frequency	Annual episodic
Fecundity (number of eggs)	10,000-100,000
Generation time	1-2 years
Age at maturity	1 year
Season	May - June
Life span	2-5 years

Larval characteristics

Larval/propagule type	-
Larval/juvenile development	Planktotrophic
Duration of larval stage	11-30 days
Larval dispersal potential	Greater than 10 km
Larval settlement period	Insufficient information

Life history information

Owenia fusiformis is an annual breeder, gonochoric, with external fertilization (Rouse & Pleijel, 2001). Up to 70,000 oocytes mature from September to April (Gentil *et al.*, 1990) and are spawned during May and June (Rouse & Pleijel, 2001). Oocytes are up to 100 µm in diameter (Rouse & Pleijel, 2001). The sex ratio is female biased and is around 0.86:1. Maturity is size-dependent and all worms 60 mm long or more are mature but some individuals reach maturity at 24 mm. Some individuals may breed in their first year if they can grow fast enough (Gentil *et al.*, 1990). In late May, larval densities can be up to 100,000 per m^3 (Thiebaut *et al.*, 1992) and settled densities vary from 4,000 to 15,000 juveniles per m^2 (Menard *et al*., 1990).

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	Very low

Owenia fusiformis is an infaunal organism and removal of the substratum is likely to also remove adults. Therefore an intolerance of high has been recorded. Due to high fecundity and the prevalence of allochthonous larval supply (Barnay *et al*., 2003), recovery of a population is likely to occur in less than a year.

	Intolerance	Recoverability	Sensitivity	Confidence
Smothering	Intermediate	High	Low	Moderate

Owenia fusiformis in the intertidal and shallow subtidal are likely to be buried as a result of wave action disturbing sediments but can work their way back up to the surface in the flexible tube (Wells *et al*., 1981). *Owenia fusiformis* also occurs in areas where dredging spoil is deposited (Dauvin & Gillet, 1991). However, juveniles cannot construct tubes in sediments with a grain size <63 µm. Therefore, if a lot of clay and silt was deposited around a population of *Owenia fusiformis* recruits will not be able to construct tubes, juvenile mortality will be high, and an intolerance of intermediate has been recorded.

	Intolerance	Recoverability	Sensitivity	Confidence
Increase in suspended sediment	Tolerant*	Not relevant	Not sensitive*	Moderate

Owenia fusiformis occurs in front of river outlets (Somaschini, 1993) and in areas where dredging spoil is dumped (Dauvin & Gillet, 1991), and therefore is probably tolerant of an increase in suspended sediment. *Owenia fusiformis* feeds on suspended organic matter. Therefore an increase in the concentration of phytoplankton and particulate organic matter is likely to be of benefit to *Owenia fusiformis*, and tolerant* has been recorded.

	Intolerance	Recoverability	Sensitivity	Confidence
Decrease in suspended sediment	Tolerant	Not relevant	Not sensitive	

Owenia fusiformis is a suspension feeder and deposit feeder (Rouse & Pleijel, 2001) but is not reliant on suspended sediment as such and is probably tolerant of a decrease in suspended sediment.

	Intolerance	Recoverability	Sensitivity	Confidence
Dessication	Not relevant	Not relevant	Not relevant	Very low

Owenia fusiformis occurs in the intertidal, however, it is infaunal and probably escapes the effects of desiccation due to interstitial water in the fine sediments it inhabits. If desiccation were to occur, intolerance would most likely be intermediate.

	Intolerance	Recoverability	Sensitivity	Confidence
Increase in emergence regime	High	High	Moderate	Very low

Owenia fusiformis is mostly found subtidally to abyssal depths but some are found intertidally. An increase in emergence would probably cause those towards the upper limit of distribution to succumb to starvation and/or desiccation. An intolerance of high has been recorded for individuals where emergence is relevant.

	Intolerance	Recoverability	Sensitivity	Confidence
Decrease in emergence regime	Tolerant*	Not relevant	Not sensitive*	

As *Owenia fusiformis* is a mainly subtidal species, a decrease in emergence is unlikely to affect it and previously intertidal populations may actually increase in density and tolerant* has been recorded.

Increase in water flow rate Tolerant Not relevant Not sensitive Low

Increase in water flow rate will most likely cause winnowing of the sediment, exposing tubes of *Owenia fusiformis*. However, *Owenia fusiformis* is found in front of river outlets in the Mediterranean and can be subject to a wide range of water velocities. The tubes of *Owenia fusiformis* can stabilize the sediment and reduce water movement related stresses on the benthos (Somaschini, 1993). *Owenia fusiformis* is probably tolerant to changes in water flow rate.

Decrease in water flow rate Intermediate High Low Moderate

A decrease in water flow rate is likely to cause an increase in siltation, however, *Owenia fusiformis* can migrate up through the sediment in their flexible tube (Wells *et al*., 1981). However, deposition of sediment with grain sizes <63 µm is likely to cause high mortality amongst recruits which cannot construct tubes in this sort of sediment. An intolerance of intermediate has been recorded to account for recruitment failure in silts and clays.

Increase in temperature Low High Low Low

Owenia fusiformis is a cosmopolitan species and is found in waters from -1 to 30 °C (Dauvin & Thiebaut, 1994) globally. In the Bay of Seine, where there is a large population of *Owenia fusiformis*, the temperature varies between 5 and 20 °C (Gentil *et al*., 1990). Some stress may be caused to *Owenia fusiformis* by temperature changes and an intolerance of low has been recorded.

Decrease in temperature Low High Low Low

Owenia fusiformis is a cosmopolitan species and is found in waters from -1 to 30 °C (Dauvin & Thiebaut, 1994) globally. In the Bay of Seine, where there is a large population of *Owenia fusiformis*, the temperature varies between 5 and 20 °C (Gentil *et al*., 1990). Some stress may be caused to *Owenia fusiformis* due to temperature changes and an intolerance of low has been recorded.

Increase in turbidity Tolerant Not relevant Not sensitive Low

Owenia fusiformis feeds on suspended organic matter and phytoplankton. While an increased turbidity is likely to decrease phytoplankton productivity, it can also feed on organic particulates and is unlikely to be adversely affected. Therefore, tolerant has been recorded.

Decrease in turbidity Tolerant Not relevant Not sensitive

A decrease in turbidity is likely to increase phytoplankton productivity and hence potentially augment its food supply. Therefore, tolerant has been recorded.

Increase in wave exposure Intermediate High Low Very low

Wells *et al*., (1981) reported that *Owenia fusiformis* in the intertidal and shallow subtidal are likely to be buried as a result of wave action but can survive this by working its way up through the sediment in its flexible tube. However, the effect of being washed out of the sediment by wave action was not commented on. In this situation, *Owenia fusiformis* would probably have to rebury in the in the sediment and construct a new tube. This is unlikely to occur quickly enough to avoid predation by flatfish and opportunistic predators and intermediate has been recorded to account for the high mortality caused.

Decrease in wave exposure Intermediate Not relevant Low

A decrease in wave exposure is likely to cause increased siltation which adult *Owenia fusiformis* can probably survive (Dauvin & Gillet, 1991; Wells *et al*., 1981). However, juveniles cannot construct tubes in sediments with a grain size <63 µm. Therefore if there is a lot clay and silt deposited around a population of *Owenia fusiformis* recruits will not be able to construct tubes, juvenile mortality will be high, and an intolerance of intermediate has been recorded.

Noise	Tolerant	Not relevant	Not sensitive	Very low

Owenia fusiformis can probably detect vibrations in the water and sediment, which may reduce feeding activity but is likely to be tolerant of noise at the benchmark level.

Visual Presence	Tolerant	Immediate	Not sensitive	Very low

Owenia fusiformis has very simple eyes for light perception and therefore will not be affected by visual disturbance

Abrasion & physical disturbance	Low	High	Low	Low

Owenia fusiformis can be up to 10 cm in length (Hayward & Ryland, 1990) and its tubes up to 30 cm in length (Rouse & Pleijel, 2001). Therefore, a passing scallop dredge is likely to remove the anterior end, which can be regenerated (Gibbs *et al*., 2000), but not the whole worm. An intolerance of low has been recorded to account for this perturbation.

Displacement	High	High	Moderate	Very low

Adult *Owenia fusiformis* probably cannot construct new tubes once removed and therefore are probably highly intolerant to displacement.

Chemical Pressures

	Intolerance	Recoverability	Sensitivity	Confidence
Synthetic compound contamination		Not relevant		Not relevant

No information was found on the effect of synthetic compounds on *Owenia fusiformis*.

	Intolerance	Recoverability	Sensitivity	Confidence
Heavy metal contamination	Tolerant	Very high	Not sensitive	Very low

Owenia fusiformis from the south coast of England were found to have loadings of 1335 µg copper per gram bodyweight and 784 µg zinc per gram bodyweight. The metals were bound in spherules within the cells of the gut (Gibbs *et al*., 2000). No mention was made of any ill effects of these concentrations of metal within the body and it is presumed that *Owenia fusiformis* is tolerant of heavy metal contamination.

	Intolerance	Recoverability	Sensitivity	Confidence
Hydrocarbon contamination		Not relevant		Not relevant

A few *Owenia fusiformis* were recorded in the subtidal sediments of the Pembrokeshire coast after the *Sea Empress* oil spill but whether densities had increased, decreased or remained the same was not recorded (Rutt *et al*., 1998). An intolerance to oil cannot be assessed for *Owenia fusiformis* on the basis of other polychaetes as some are tolerant to oil and others highly intolerant (Kingston *et al*., 1997).

	Intolerance	Recoverability	Sensitivity	Confidence
Radionuclide contamination		Not relevant		Not relevant

No information was found on the effect of radionuclides on *Owenia fusiformis*.

	Intolerance	Recoverability	Sensitivity	Confidence
Changes in nutrient levels	Tolerant*	Not relevant	Not sensitive*	Low

Increases in nutrient levels are likely to increase phytoplankton productivity, which would benefit *Owenia fusiformis* populations. Therefore tolerant* has been recorded.

	Intolerance	Recoverability	Sensitivity	Confidence
Increase in salinity		Not relevant		Not relevant

No information was found on the effects of hypersalinity on *Owenia fusiformis*.

Decrease in salinity	Low	High	Low	Low

Owenia fusiformis is found in front of river outlets in the Mediterranean (Somaschini, 1993) and English Channel (Gentil *et al*., 1990) and probably has a low intolerance to decreases in salinity.

Changes in oxygenation	Tolerant	Immediate	Not sensitive	High

Owenia fusiformis is very tolerant of anoxia and can tolerate anaerobic conditions for up to 21 days by becoming quiescent (Dales, 1958) and therefore is tolerant to changes in oxygenation.

Biological Pressures

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

No information was found on the effects of microbial pathogens on *Owenia fusiformis*.

Introduction of non-native species		Not relevant		Not relevant

No information was found on the effects of alien species on *Owenia fusiformis*.

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

Owenia fusiformis is not known to be targeted for extraction.

Extraction of other species	Low	Very high	Very Low	Low

Trawls and dredges may remove the anterior end of *Owenia fusiformis* but the worm regenerates lost ends (Gibbs *et al*., 2000) and an intolerance of low has been recorded.

Additional information

Owenia fusiformis has high individual fecundity and high population density. Larval life is long and there is often free exchange of larvae between populations. Spatfall is usually very dense, growth rapid and in optimal conditions, and *Owenia fusiformis* can reproduce in its first year. Recoverability of this species is likely to be high but variable in rate because wind driven currents and adult fecundity will determine larval supply to defaunated areas.

Importance review

Policy/legislation

- no data -

Status

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

Non-native

Native	-		
Origin	-	**Date Arrived**	-

Importance information

-none-

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