A bristleworm (*Aphelochaeta marioni*)

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/1556]. All terms and the MarESA methodology are outlined on the website (https://www.marlin.ac.uk)

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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**	Dr Peter Gibbs
Authority	(Saint-Joseph, 1894)		
Other common names	-	**Synonyms**	*Tharyx marioni* (Saint-Joseph, 1894)

Summary

Description

Aphelochaeta marioni is a thin, thread like, segmented worm. The fifth segment bears a pair of grooved tentacles, or palps, which are used for deposit feeding. The palps, which are tightly coiled when retracted, are approximately equal in length to the body. Numerous filamentous cirri, which act as gills, are arranged in pairs on each of the segments of the anterior half of the body. The bristles (chaetae) are very fine and hair like. *Aphelochaeta marioni* is reddish-brown in colour and typically between 20 and 35 mm in length, although individuals can reach 100 mm in length.

Recorded distribution in Britain and Ireland

Patchily distributed all around the British coast where suitable substrata exist. Occurs on the south west and south coasts of the Isle of Man and has also been recorded in north east Ireland.

Global distribution

Recorded from parts of the North Atlantic, North Sea, western Baltic, Mediterranean, South

Pacific and the Indian Ocean.

Habitat

Aphelochaeta marioni lives buried in soft sediments in the intertidal and subtidal. The majority of individuals live in the upper 4 cm of the sediment, with the smaller animals nearer the surface. It is sometimes present in sandy sediments, but predominates in zones of muddy sand or silt, especially in areas where the surface of the sediment consists of diatom ooze. It is occasionally found in the sediment that accumulates in rock crevices or around seaweed holdfasts.

Depth range

Mid shore to 5000 m

Identifying features

- Body with 200 segments or more.
- First segment (prostomium) is a blunt cone without eyes.
- Following 3 segments achaetous.
- Pair of coiling palps located on first chaetiger.
- Long, contractile gill filaments present from first chaetiger to mid-point of body.
- Chaetae very fine and hair like.

Additional information

The name change from *Tharyx marioni* to *Aphelochaeta marioni* occurred recently and some authors still use the previous name. Therefore, care should be taken when searching the literature on this species. In this review, where the species was researched under the former name, the species name is given as *Aphelochaeta marioni* (studied as *Tharyx marioni*). *Aphelochaeta marioni* is very difficult to identify (Mike Kendall, pers. comm.) and some authors (e.g. Farke, 1979) have commented that specimens that have been the subject of published research may have been misidentified.

Listed by

Further information sources

Search on:

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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	Terebellida	
Family	Cirratulidae	
Genus	Aphelochaeta	
Authority	(Saint-Joseph, 1894)	
Recent Synonyms	Tharyx marioni (Saint-Joseph, 1894)	

Biology

Typical abundance	High density
Male size range	10-100mm
Male size at maturity	10mm
Female size range	10mm
Female size at maturity	
Growth form	Vermiform segmented
Growth rate	1-1.5mm/month
Body flexibility	High (greater than 45 degrees)
Mobility	
Characteristic feeding method	Not relevant, Surface deposit feeder
Diet/food source	
Typically feeds on	Organic debris, diatoms
Sociability	
Environmental position	Infaunal
Dependency	Independent.
Supports	None
Is the species harmful?	No information

Biology information

Abundance

Gibbs (1969) studied the abundance of *Aphelochaeta marioni* (studied as *Tharyx marioni*) in Stonehouse Pool, Plymouth Sound. In silt/clay sediments at 5 m depth, the species occurred at a maximum density of 108,000 individuals/m^2. In silt/clay and fine sand at the low water mark, the maximum density was 61,150 individuals/m^2. Farke (1979) studied the abundance of *Aphelochaeta marioni* (studied as *Tharyx marioni*) in the Wadden Sea, Netherlands. In the intertidal, the maximum recorded abundance was 71,200 individuals/m^2 in muddy sand.

Feeding

Aphelochaeta marioni is a deposit feeder, feeding at the surface of the sediment at night. While feeding the animal remains in its burrow and the two palps roam at the surface transporting sand, debris and diatoms to the mouth along a tentacle canal crenulated with cilia. Farke (1979) is unsure whether *Aphelochaeta marioni* is a selective feeder, but it seems not, as sand grains have been found in the gut of the animal.

Habitat preferences

Physiographic preferences	Open coast, Offshore seabed, Strait / sound, Estuary, Enclosed coast / Embayment
Biological zone preferences	Bathybenthic (Bathyal), Circalittoral offshore, Lower circalittoral, Lower eulittoral, Lower infralittoral, Mid eulittoral, Sublittoral fringe, Upper circalittoral, Upper infralittoral
Substratum / habitat preferences	Fine clean sand, Mud, Muddy sand, Sandy mud
Tidal strength preferences	Moderately Strong 1 to 3 knots (0.5-1.5 m/sec.), Very Weak (negligible), Weak < 1 knot (<0.5 m/sec.)
Wave exposure preferences	Extremely sheltered, Sheltered, Very sheltered
Salinity preferences	Full (30-40 psu), Low (<18 psu), Reduced (18-30 psu), Variable (18-40 psu)
Depth range	Mid shore to 5000 m
Other preferences	
Migration Pattern	Non-migratory / resident

Habitat Information

Aphelochaeta marioni has been recorded from a variety of different sediment types. In the intertidal area of the Wadden Sea, it achieved highest abundance where the sediment fraction smaller than 0.04 mm diameter was greater than 10% of the total sediment (Farke, 1979). In the Severn Estuary, *Aphelochaeta marioni* (studied as *Tharyx marioni*) characterized the faunal assemblage of very poorly oxygenated, poorly sorted mud with relatively high interstitial salinity (Broom *et al.*, 1991). In fact, *Aphelochaeta marioni* displays a remarkable tolerance for salinity range. Wolff (1973) recorded *Aphelochaeta marioni* (studied as *Tharyx marioni*) from brackish inland waters in the Netherlands with a salinity of 16 psu, but not in areas permanently exposed to lower salinities. Farke (1979) reported that the species also penetrated into areas exposed to salinities of 4 psu during short periods at low tide when the freshwater discharge from rivers was high.

Life history

Adult characteristics

Reproductive type	Gonochoristic (dioecious)
Reproductive frequency	Annual episodic
Fecundity (number of eggs)	100-1,000
Generation time	1-2 years
Age at maturity	1 year
Season	See additional information

Life span	2-3 years

Larval characteristics

Larval/propagule type	-
Larval/juvenile development	Lecithotrophic
Duration of larval stage	Not relevant
Larval dispersal potential	See additional information
Larval settlement period	

Life history information

The lifecycle of *Aphelochaeta marioni* varies according to environmental conditions. In Stonehouse Pool, Plymouth Sound, *Aphelochaeta marioni* (studied as *Tharyx marioni*) spawned in October and November (Gibbs, 1971) whereas in the Wadden Sea, Netherlands, spawning occurred from May to July (Farke, 1979). Spawning, which occurs at night, was observed in a microsystem in the laboratory by Farke (1979). The female rose up into the water column with the tail end remaining in the burrow. The eggs were shed within a few seconds and sank to form puddles on the sediment. The female then returned to the burrow and resumed feeding within half an hour. Fertilization was not observed, probably because the male does not leave the burrow. The embryos developed lecithotrophically and hatched in about 10 days (Farke, 1979). The newly hatched juveniles were *ca* 0.25 mm in length with a flattened, oval body shape, and had no pigment, chaetae, cirri or palps. Immediately after hatching, the juveniles dug into the sediment. Where the sediment depth was not sufficient for digging, the juveniles swam or crawled in search of a suitable substratum (Farke, 1979). In the microsystem, juvenile mortality was high (*ca* 10% per month) and most animals survived for less than a year (Farke, 1979). In the Wadden Sea, the majority of the cohort reached maturity and spawned at the end of their first year, although some slower developers did not spawn until the end of their second year (Farke, 1979). However, the population of *Aphelochaeta marioni* in Stonehouse Pool spawned for the first time at the end of the second year of life (Gibbs, 1971). There was no evidence of a major post-spawning mortality and it was suggested that individuals may survive to spawn over several years. Gibbs (1971) found that the number of eggs laid varied from 24-539 (mean=197) and was correlated with the female's number of genital segments, and hence, female size and age.

Dispersal

Under stable conditions, adult and juvenile *Aphelochaeta marioni* disperse by burrowing (Farke, 1979). In the microsystem, a glass barrier in the sediment prevented the movement of animals to new areas over a period of some months, even though dispersal could have occurred by creeping on the surface or swimming. When the barrier was removed, the new areas were soon colonized (Farke, 1979). Farke (1979) reported that *Aphelochaeta marioni* (studied as *Tharyx marioni*) was capable of swimming but only did so under abnormal circumstances, e.g. when removed from the sediment. Farke (1979) suggested that as there was no pelagic stage, dispersal and immigration to new areas must mainly occur during periods of erosion when animals are carried away from their habitat by water currents.

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	Low

Aphelochaeta marioni lives infaunally in soft sediments. The physical removal of its substratum, e.g. as a result of channel dredging activities, would also remove the entire population of *Aphelochaeta marioni* and hence, intolerance is recorded as high. *Aphelochaeta marioni* has no pelagic phase in its lifecycle, and dispersal is limited to lateral movement by the slow burrowing of the adults and juveniles (Farke, 1979). Recoverability is recorded as high (see additional information below).

Smothering	Low	Immediate	Not sensitive	Low

Aphelochaeta marioni lives infaunally in soft sediments and moves by burrowing. It deposit feeds at the surface by extending contractile palps from its burrow. An additional 5 cm layer of sediment would result in a temporary cessation of feeding activity, and therefore growth and reproduction are likely to be compromised. However, *Aphelochaeta marioni* would be expected to quickly relocate to its favoured depth, with no mortality, and hence an intolerance of low is recorded. Once the animals have relocated to the surface, feeding activity should return to normal and therefore a recoverability of immediate is recorded.

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

Aphelochaeta marioni is not likely to be perturbed by an increase in suspended sediment because it lives infaunally in soft sediment (Brenchley, 1981). It is a surface deposit feeder. While feeding, the animal remains in its burrow and the two palps roam at the surface transporting sand, debris and diatoms to the mouth along a tentacle canal crenulated with cilia (Farke, 1979). An increased rate of siltation may result in an increase in food availability and therefore growth and reproduction of *Aphelochaeta marioni* may be enhanced. However, food availability would only increase if the additional suspended sediment contained a significant proportion of organic matter and the population would only be enhanced if food was previously limiting.

Decrease in suspended sediment	Low	Immediate	Not sensitive	Low

Aphelochaeta marioni is a surface deposit feeder and therefore relies on a supply of nutrients at the sediment surface. A decrease in the suspended sediment would result in a decreased rate of deposition on the substratum surface and therefore a reduction in food availability for *Aphelochaeta marioni*. This would be likely to impair growth and reproduction. The benchmark states that this change would occur for one month and therefore would be unlikely to cause mortality. An intolerance of low is therefore recorded. As soon as suspended sediment levels increased, feeding activity would return to normal and hence recovery is recorded as immediate.

Dessication	Not relevant	Not relevant	Not relevant	Not relevant

Aphelochaeta marioni lives infaunally in sediment that has a high silt content and retains a large amount of water. It is therefore protected from desiccation stress.

Increase in emergence regime	Intermediate	High	Low	Low

Aphelochaeta marioni lives in the intertidal zone in significant numbers (Gibbs, 1969; Farke, 1979). The species lives infaunally and hence is not likely to suffer from desiccation stress. However, *Aphelochaeta marioni* can only feed when immersed and therefore will experience reduced feeding opportunities. Over the course of a year the resultant energetic cost is likely to cause some mortality. In addition, increased emergence will increase the vulnerability to predation from shore birds. An intolerance of intermediate is therefore recorded. Recoverability is recorded as high (see additional information below).

Decrease in emergence regime	Tolerant	Not relevant	Not sensitive	High

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

Increase in water flow rate	Intermediate	High	Low	Low

An increase in water flow rate is not likely to affect *Aphelochaeta marioni* directly as it lives infaunally. However, increased water flow rate will change the sediment characteristics in which the species lives, primarily by re-suspending and preventing deposition of finer particles (Hiscock, 1983). The preferred habitat of *Aphelochaeta marioni* has a high silt content (Gibbs, 1969), a substratum which would not occur in very strong tidal streams. Therefore, the species would be outside its habitat preference and some mortality would be likely to occur. Additionally, the consequent lack of deposition of particulate matter at the sediment surface would reduce food availability. The resultant energetic cost over one year would also be likely to result in some mortality. An intolerance of intermediate is therefore recorded. Recoverability is recorded as high (see additional information below).

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

Aphelochaeta marioni thrives in areas with low water flow, including the lowest category on the water flow scale (Connor *et al*., 1997), and is tolerant of hypoxia (Broom *et al*., 1991). Hence, the species is likely to tolerate a reduction in water flow. However, decreased water movement would result in increased deposition of suspended sediment (Hiscock, 1983). An increased rate of siltation may result in an increase in food availability for *Aphelochaeta marioni* and therefore growth and reproduction may be enhanced, but only if food was previously limiting.

Increase in temperature	Low	Very high	Very Low	Low

Aphelochaeta marioni is distributed over a wide temperature range. It has been recorded from the Mediterranean Sea and Indian Ocean (Hartmann-Schröder, 1974; Rogall, 1977; both cited in Farke, 1979) and therefore the species must be capable of tolerating higher temperatures than it experiences in Northern Europe. Furthermore, *Aphelochaeta marioni* lives infaunally and so is likely to be insulated from rapid temperature change. An increase in temperature would be expected to cause some physiological stress but no mortality and therefore an intolerance of low is recorded. Metabolic activity should quickly return to normal when temperatures decrease and so a recoverability of very high is recorded.

Decrease in temperature	Low	Very high	Very Low	Low

Aphelochaeta marioni is distributed over a wide temperature range. It has been recorded from the Western Baltic Sea, South Atlantic Ocean and North Sea (Hartmann-Schröder, 1974; Rogall, 1977: both cited in Farke, 1979) and therefore the species must be capable of tolerating low temperatures. *Aphelochaeta marioni* lives buried in sediment and is therefore well insulated from decreases in temperature. In the Wadden Sea, the population was apparently unaffected by a short period of severe frost in I973 (Farke, 1979). A decrease in temperature would be likely to cause some physiological stress but no mortality and therefore an intolerance of low is recorded. Metabolic activity should quickly return to normal when temperatures increase and so a recoverability of very high is recorded.

Increase in turbidity Low Very high Very Low Low

Aphelochaeta marioni typically inhabits turbid waters such as estuaries. It does not require light and therefore is not directly affected by an increase in turbidity for the purposes of light attenuation. An increase in turbidity may affect primary production in the water column and therefore reduce the availability of diatom food sinking to the sediment surface. In addition, primary production by the micro-phyto benthos on the sediment surface may be reduced, further decreasing food availability. 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 High

Aphelochaeta marioni does not require light and therefore would not be affected by a decrease in turbidity for light attenuation purposes.

Increase in wave exposure High High Moderate Low

Aphelochaeta marioni characteristically inhabits soft sediments in sheltered areas. This suggests that it would be intolerant of wave exposure to some degree. An increase in wave exposure by two categories for one year would be likely to affect the species in several ways. Fine sediments would be eroded (Hiscock, 1983) resulting in the likely reduction of the habitat of *Aphelochaeta marioni* and a decrease in food availability. Strong wave action is also likely to cause damage or withdrawal of delicate feeding and respiration structures resulting in loss of feeding opportunities and compromised growth. Furthermore, individuals may be damaged or dislodged by scouring from sand and gravel mobilized by increased wave action. It is likely that high mortality would result from the considerations discussed above and therefore an intolerance of high is recorded. Recoverability is recorded as high (see additional information below).

Decrease in wave exposure Tolerant Not relevant Not sensitive High

Aphelochaeta marioni characteristically inhabits soft sediments in sheltered areas and is tolerant of hypoxia (Broom *et al.*, 1991). It is therefore likely to tolerate a decrease in wave exposure.

Noise Tolerant Not relevant Not sensitive Low

No information was found concerning the intolerance of *Aphelochaeta marioni* to noise. However, it is unlikely to be affected by noise and vibration at the level of the benchmark.

Visual Presence Low Immediate Not sensitive High

Aphelochaeta marioni is only active at night (Farke, 1979). Farke (1979) noted their intolerance to visual disturbance in a microsystem in the laboratory. In order to observe feeding and breeding in the microsystem, the animals had to be gradually acclimated to lamp light. Even then, additional disturbance, such as an electronic flash, caused the retraction of palps and cirri and cessation of all activity for some minutes. Visual disturbance, in the form of direct illumination during the species' active period at night, may therefore result in loss of feeding opportunities, which may compromise growth and reproduction. Hence, an intolerance of low is recorded. When the visual disturbance is removed feeding activity should return to normal immediately.

Abrasion & physical disturbance Intermediate | High | Low | Low

Aphelochaeta marioni is a soft bodied organism which exposes its palps and cirri at the surface while feeding. The species lives infaunally in soft sediment, usually within a few centimetres of the sediment surface. Physical disturbance, such as dredging or dragging an anchor, would be likely to penetrate the upper few centimetres of the sediment and cause physical damage to *Aphelochaeta marioni*. An intolerance of intermediate is therefore recorded. Recoverability is recorded as high (see additional information below).

Displacement Tolerant | Not relevant | Not sensitive | High

Farke (1979) noted the effects of displacement on *Aphelochaeta marioni* (studied as *Tharyx marioni*) while performing experiments on intolerance to salinity changes. It was observed that when an individual was removed from its habitat and displaced to a similar habitat, it took approximately one minute to dig itself into the sediment. *Aphelochaeta marioni* is therefore recorded as not sensitive to displacement.

Chemical Pressures

	Intolerance	Recoverability	Sensitivity	Confidence
Synthetic compound contamination	High	High	Moderate	Very low

There is no evidence directly relating to the effects of synthetic chemicals on *Aphelochaeta marioni*. However, there is evidence from other polychaete species. Collier & Pinn (1998) investigated the effect on the benthos of ivermectin, a feed additive treatment for infestations of sea-lice on farmed salmonids. The polychaete *Hediste diversicolor* was particularly susceptible, exhibiting 100% mortality within 14 days when exposed to 8 mg/m^2 of ivermectin in a microcosm. *Arenicola marina* was also intolerant of ivermectin through the ingestion of contaminated sediment (Thain *et al.*, 1998; cited in Collier & Pinn, 1998) and it was suggested that deposit feeding was an important route for exposure to toxins. Beaumont *et al.* (1989) investigated the effects of tri-butyl tin (TBT) on benthic organisms. At concentrations of 1-3 µg/l there was no significant effect on the abundance of *Hediste diversicolor* or *Cirratulus cirratus* (family Cirratulidae) after 9 weeks in a microcosm. However, no juvenile polychaetes were retrieved from the substratum and hence there is some evidence that TBT had an effect on the larval and/or juvenile stages of these polychaetes. The high mortality of polychaetes due to exposure to ivermectin suggests a high intolerance to synthetic chemicals, but this decision is made with very low confidence. Recoverability is recorded as high (see additional information below).

Heavy metal contamination Low | Very high | Very Low | Low

Bryan (1984) suggested that polychaetes are rather tolerant of heavy metals. In Restronguet Creek, the sediments contained levels of arsenic, copper and tin two orders of magnitude higher than in unpolluted estuaries, while levels of silver and zinc were approximately forty times higher (Bryan & Gibbs, 1983). The presence of *Aphelochaeta marioni* in this area (Bryan & Gibbs, 1983) suggests that the species is tolerant of heavy metal contamination. Furthermore, *Aphelochaeta marioni* was shown to accumulate arsenic (Gibbs *et al.*, 1983). *Aphelochaeta marioni* (studied as *Tharyx marioni*) was found to have whole body concentrations of arsenic greater than 2000 µg/g dry weight (even when living under low ambient arsenic conditions).

For reference, other Cirratulids, e.g. *Cirriformia tentaculata*, from the same habitat contained arsenic at concentrations lower than 100 µg/g dry weight. The purpose of the arsenic accumulation is unclear. Trials with gobies failed to confirm that it was a predator deterrent mechanism and it is probably not a detoxification mechanism as arsenic accumulations were similar for worms living in widely varying arsenic concentrations. Hence, there is no evidence to suggest that *Aphelochaeta marioni* is intolerant of heavy metal contamination. However, other annelids have been shown to be intolerant of heavy metal contamination (e.g. see review by Crompton, 1997) and therefore an intolerance of low is recorded. Due to their tolerance, a recoverability of very high is recorded.

Hydrocarbon contamination	Tolerant*	Not relevant	Not sensitive*	Moderate

Cirratulids seem to be mostly immune to oil spills, probably because their feeding tentacles are protected by a heavy secretion of mucus (Suchanek, 1993). This is supported by observations of *Aphelochaeta marioni* following the *Amoco Cadiz* oil spill in March, 1978 (Dauvin, 1982, 2000). Prior to the spill, *Aphelochaeta marioni* (studied as *Tharyx marioni*) was present in very low numbers in the Bay of Morlaix, western English Channel. Following the spill, the level of hydrocarbons in the sediment increased from 10 mg/kg dry sediment to 1443 mg/kg dry sediment 6 months afterwards. In the same period, *Aphelochaeta marioni* increased in abundance to a mean of 76 individuals/m^2, which placed it among the top five dominant species in the faunal assemblage. It was suggested that the population explosion occurred due to the increased food availability because of accumulation of organic matter resulting from high mortality of browsers. Six years later, abundance of *Aphelochaeta marioni* began to fall away again, accompanied by gradual decontamination of the sediments. *Aphelochaeta marioni* is therefore recorded as not sensitive, with a potential to benefit from hydrocarbon contamination.

Radionuclide contamination		Not relevant		Not relevant

No evidence was found concerning the intolerance of *Aphelochaeta marioni* to radionuclide contamination.

Changes in nutrient levels	Intermediate	High	Low	Very low

Raman & Ganapati (1983) studied the distribution of *Aphelochaeta marioni* (studied as *Tharyx marioni*) in relation to a sewage outfall in Visakhaptnam Harbour, Bay of Bengal. *Aphelochaeta marioni* was found to be dominant in the 'semi-healthy zone' characterized by high dissolved oxygen (median 7.2 mg/l), low biological oxygen demand (9.6 mg/l) and low nutrients (nitrate 0.02 mg/l, phosphate 0.88 mg/l). *Aphelochaeta marioni* was not found in high numbers in the polluted zone close to the sewage outfall, characterized by low dissolved oxygen (median 6.0 mg/l), high biological oxygen demand (14-60 mg/l) and high nutrients (nitrate 0.042-0.105 mg/l, phosphate 2.35-3.76 mg/l). This would suggest that *Aphelochaeta marioni* is intolerant of eutrophication. However, it would be expected that an increase in organic nutrients would lead to increased food availability for the deposit feeding *Aphelochaeta marioni* and that the species would thrive provided it could tolerate the increase in biological oxygen demand. Broom *et al.* (1991) stated that *Aphelochaeta marioni* was characteristic of faunal assemblages in the Severn Estuary with very poorly oxygenated mud and Thierman *et al.* (1996) noted that *Aphelochaeta marioni* "does not have a massively adverse reaction to sulphidic conditions". Furthermore, Dauvin (1982, 2000) recorded an increase in abundance of *Aphelochaeta marioni* following an oil spill which resulted in an explosion of plant growth due to high mortality of grazers. Therefore, the available evidence on intolerance of *Aphelochaeta marioni* to nutrient changes does not allow consistent conclusions to be drawn. The worst case scenario is that nutrient enrichment will lead to reduced abundance of *Aphelochaeta marioni* so an intolerance of intermediate is recorded, with very low confidence. Recoverability is recorded as high (see additional information below).

Increase in salinity	Tolerant	Not relevant	Not sensitive	High

Populations of *Aphelochaeta marioni* inhabit the open coast where sea water is at full salinity. They are clearly capable of thriving in fully saline conditions and hence probably relatively tolerant of increases in salinity. No information was found concerning the reaction to hypersaline conditions (>40psu). Farke (1979) studied the effects of changing salinity on *Aphelochaeta marioni* (studied as *Tharyx marioni*) in a microsystem in the laboratory. Over several weeks, the salinity in the microsystem was increased from 25-40 psu and no adverse reaction was noted. However, when individuals were removed from the sediment and displaced to a new habitat, they only dug into their new substratum if the salinities in the two habitats were similar. If the salinities differed by 3-5 psu, the worms carried out random digging movements, failed to penetrate the sediment and died at the substratum surface after a few hours. This would suggest that *Aphelochaeta marioni* can tolerate salinity changes when living infaunally but is far more intolerant when removed from its habitat.

Decrease in salinity	Tolerant	Not relevant	Not sensitive	High

Aphelochaeta marioni thrives in estuaries and is therefore likely to be tolerant of decreases in salinity. It has been recorded from brackish inland waters in the Southern Netherlands with a salinity of 16 psu, but not in areas permanently exposed to lower salinities (Wolff, 1973). However, it also penetrates into areas exposed to salinities as low as 4 psu for short periods at low tide when fresh water discharge from rivers is high (Farke, 1979). The distribution of *Aphelochaeta marioni*, therefore, suggests that it is very tolerant of low salinity conditions.

Changes in oxygenation	Low	Very high	Very Low	Low

Connor *et al.* (1997) described sediments in which *Aphelochaeta marioni* is commonly found as usually with a "black anoxic layer close to the sediment surface." Broom *et al.* (1991) recorded that *Aphelochaeta marioni* (studied as *Tharyx marioni*) characterized the faunal assemblage of very poorly oxygenated mud in the Severn Estuary. They found *Aphelochaeta marioni* to be dominant where the redox potential at 4 cm sediment depth was 56 mV and, therefore, concluded that the species was tolerant of very low oxygen tensions. Thierman *et al.* (1996) studied the distribution of *Aphelochaeta marioni* in relation to hydrogen sulphide concentrations. The species was found to be abundant at low sulphide concentrations (<50 μM) but only occasional at concentrations from 75-125 μM. They concluded that *Aphelochaeta marioni* does not display a massively adverse reaction to sulphidic conditions and is able to tolerate a low amount of sulphide. The evidence suggests that *Aphelochaeta marioni* is capable of tolerating hypoxia but it is difficult to determine to what degree. It is likely that feeding, growth and reproduction would be impaired under sustained low oxygen conditions and therefore an intolerance of low is recorded. Activity should return to normal when oxygen tensions increase and therefore a recoverability of very high is recorded.

Biological Pressures

	Intolerance	Recoverability	Sensitivity	Confidence
Introduction of microbial pathogens/parasites	Low	Very high	Very Low	Low

Gibbs (1971) recorded that nearly all of the population of *Aphelochaeta marioni* in Stonehouse Pool, Plymouth Sound, was infected with a sporozoan parasite belonging to the acephaline gregarine genus *Gonospora*, which inhabits the coelom of the host. No evidence was found to suggest that gametogenesis was affected by *Gonospora* infection and there was no apparent reduction in fecundity. However, any parasitic infection is likely to impair the host in some way and an intolerance of low is recorded. If the parasite were to be removed, the host would be likely to return to normal health quickly so a recoverability of very high is recorded. No other information was found concerning infection of *Aphelochaeta marioni* by microbial pathogens.

Introduction of non-native species		Not relevant		Not relevant

No information was found concerning non-native species which would be likely to compete with *Aphelochaeta marioni*.

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

There is no evidence that *Aphelochaeta marioni* is extracted deliberately.

Extraction of other species	Intermediate	High	Low	Very low

Commercial extraction of other infaunal species is likely to have an effect on *Aphelochaeta marioni* where their distributions overlap. Hall & Harding (1997) demonstrated that commercial cockle harvesting by suction dredging had significant effects on soft-sediment infaunal communities. Following dredging, species numbers were reduced by up to 30% and abundances by up to 50%. In Maine, USA, commercial digging for worms and clams was studied by Brown & Wilson (1997). Following experimental digging for two and a half months, the densities of three polychaete species, including *Tharyx acutus*, were significantly reduced, as was the total number of taxa present. It should be noted that *Tharyx acutus* is a surface dweller and therefore has a different lifestyle to *Aphelochaeta marioni*. Hence, the inferences that can be drawn are limited. However, it seems likely that the disruption of the infaunal community caused by commercial harvesting would result in mortality of *Aphelochaeta marioni* and therefore an intolerance of intermediate is recorded. Recoverability is recorded as high (see additional information below).

Additional information

Aphelochaeta marioni has no pelagic phase in its lifecycle, and dispersal is limited to the slow burrowing of the adults and juveniles (Farke, 1979). The blow lug, *%Arenicola marina%*, has similar dispersal capabilities and its recoverability has been well studied. Heavy commercial exploitation in Budle Bay in winter 1984 removed 4 million worms in 6 weeks, reducing the population from 40 to <1 per m^2. Recovery occurred within a few months by recolonization from surrounding sediment (Fowler, 1999). However, Cryer *et al.* (1987) reported no recovery for 6 months over summer after mortalities due to bait digging. Beukema (1995) noted that the lugworm stock recovered slowly after mechanical dredging, reaching its original level in at least three years. Fowler (1999) pointed out that recovery may take a long time on a small pocket beach with limited possibility of recolonization from surrounding areas. Therefore, if adjacent populations are available recovery will be rapid. However where the affected population is isolated or severely reduced, recovery may be extended. Recoverability for *Aphelochaeta marioni* is therefore recorded as high.

Importance review

Policy/legislation

- no data -

Status

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

Non-native

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

Importance information

Reise (1977) reported that *Aphelochaeta marioni* (studied as *Tharyx marioni*) was food for *Crangon crangon*, *Carcinus maenas*, *Pomatoschistus microps* and young *Pleuronectes platessa*.

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