Sea lace or Dead man's rope (*Chorda filum*)

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

Nicola White

2006-11-07

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/1366]. All terms and the MarESA methodology are outlined on the website (https://www.marlin.ac.uk)

This review can be cited as:
White, N. 2006. *Chorda filum* Sea lace or Dead man's rope. In Tyler-Walters H. and Hiscock K. (eds) *Marine Life Information Network: Biology and Sensitivity Key Information Reviews*, [on-line]. Plymouth: Marine Biological Association of the United Kingdom.
DOI https://dx.doi.org/10.17031/marlinsp.1366.1

(page left blank)

***Chorda filum*.**
Photographer: Keith Hiscock

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	Nicola White	**Refereed by**	Dr Stefan Kraan
Authority	(Linnaeus) Stackhouse, 1797		
Other common names	-	**Synonyms**	*Chorda filum* (Linnaeus) Stackhouse, 1797

Summary

Description

Chorda filum is a brown seaweed with long cord-like fronds, only 5 mm thick in diameter. The fronds are hollow, slippery, unbranched and grow up to 8 m long. The species attaches to the substratum using a small discoid holdfast. It is an annual species, disappearing in winter.

Recorded distribution in Britain and Ireland

All coasts of Britain and Ireland, but rarer in south east England.

Global distribution

See additional information.

Habitat

Found in rock pools on the low shore and in the sublittoral down to 5 m. It is most commonly found in sheltered bays attached to stones and shells, often with the holdfast buried in sand.

Depth range

Less than 20 m

Identifying features

- Frond round in section, cord-like and unbranched.
- Attached by a tiny disc-like holdfast.
- Slimy texture.
- Colourless short hairs on frond in summer.

Additional information

Other common names include mermaid's tresses and cat gut.

Listed by

Further information sources

Search on:

G G G NBN WoRMS

Biology review

Taxonomy

Phylum	Ochrophyta	Brown and yellow-green seaweeds
Class	Phaeophyceae	
Order	Laminariales	
Family	Chordaceae	
Genus	Chorda	
Authority	(Linnaeus) Stackhouse, 1797	
Recent Synonyms	Chorda filum (Linnaeus) Stackhouse, 1797	

Biology

Typical abundance	Moderate density
Male size range	Up to 8m
Male size at maturity	36cm
Female size range	36cm
Female size at maturity	
Growth form	Filiform / filamentous
Growth rate	17cm/month
Body flexibility	
Mobility	
Characteristic feeding method	Autotroph
Diet/food source	
Typically feeds on	
Sociability	
Environmental position	Epifloral
Dependency	Independent.
Supports	No information
Is the species harmful?	No

Biology information

Chorda filum is a summer annual, falling into decay in the autumn and disappearing during winter. Growth rate is maximal during the summer. The adult frond is a hollow tube, the walls of which are spirally constructed. The frond is frequently inflated with gases in the terminal region. Plants usually grow in clumps. The end of the frond decays continuously and is replaced by growth from a sub-terminal meristem. Hairs are sparse or absent on older plants.

Habitat preferences

Physiographic preferences	Strait / sound, Sea loch / Sea lough, Ria / Voe, Estuary, Isolated saline water (Lagoon), Enclosed coast / Embayment
Biological zone preferences	Lower infralittoral, Sublittoral fringe, Upper infralittoral

Substratum / habitat preferences	Macroalgae, Gravel / shingle, Mixed, Muddy gravel, Pebbles
Tidal strength preferences	Moderately Strong 1 to 3 knots (0.5-1.5 m/sec.), Weak < 1 knot (<0.5 m/sec.)
Wave exposure preferences	Sheltered, Very sheltered
Salinity preferences	Full (30-40 psu), Low (<18 psu), Reduced (18-30 psu), Variable (18-40 psu)
Depth range	Less than 20 m
Other preferences	No text entered
Migration Pattern	Non-migratory / resident

Habitat Information

Global distribution
Canada (Arctic), Alaska, NW Atlantic from Labrador to New Jersey, Greenland, Iceland, Spitsbergen, Norway, Sweden, Denmark, The Netherlands, Belgium, the Baltic, the Faroes, France, Spain, Portugal, Canary Islands, Greece, China, Japan and south Kurile Islands, NE Pacific and the Bering Strait.

Chorda filum occurs in sheltered bays, estuaries, lagoons and sea lochs. It is rarely found on the open coast and is completely absent from exposed shores. The plants occur in clumps on a range of unstable, small objects such as pebbles and shells. It may also be found on sand and detritus but it will not remain for long on this substratum (S. Kraan, pers. comm.). They are also epiphytic on *Zostera marina* and *Fucus vesiculosus*. During stormy weather, plants may be washed to more sheltered locations where they continue development. *Chorda filum* has considerable tolerance to reduced salinities and extends into river mouths and the Baltic, where it grows at 3.5 psu. However, plants that grow in fully marine conditions cannot withstand immersion in freshwater for 2 hours (Russell, 1985).

Life history

Adult characteristics

Reproductive type	Alternation of generations
Reproductive frequency	Annual protracted
Fecundity (number of eggs)	>1,000,000
Generation time	<1 year
Age at maturity	<1 year
Season	
Life span	Insufficient information

Larval characteristics

Larval/propagule type	-
Larval/juvenile development	Spores (sexual / asexual)
Duration of larval stage	Not relevant

Larval dispersal potential	100 -1000 m
Larval settlement period	Not relevant

Life history information

Chorda filum has a similar life-history to other Laminariales, exhibiting alternation of heteromorphic generations. The species has a macroscopic diploid sporophyte and a microscopic haploid gametophyte. The gametophytes consist of clumps of prostate, branched, filaments approximately 100 micrometres long. Female gametophytes are less branched than male ones and may be distinguished by their larger more densely pigmented cells. The male gametophytes are smaller, paler in colour and more densely branched than the females. *Chorda filum* exhibits a protracted reproductive period. Visible sporophytes appear on shores between February and mid-March and develop into secondary sporophytes between April and June. The sporophytes are washed away from October to February, leaving behind zoospores or gametophytes. The size of plants is not related to their state of maturity, although the smallest plants to bear sporangia have been observed to be 36.6 cm long. When the meristem becomes indistinct it is likely that fruiting has begun. During the period of fertility the whole plant except the lowermost 5-10 cm, is covered in unilocular sporangia. Experiments on growing *Chorda filum* in culture have shown that fruiting appears to be endogenously controlled and occurs irrespective of environmental conditions (South & Burrows, 1967).

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

Chorda filum is permanently attached to the substratum and would be removed with substratum loss. Accordingly, intolerance has been assessed as high. Recruitment rates of the species are not known, however it has a fast growth rate and high fecundity and recovery rates are probably high.

	Intolerance	Recoverability	Sensitivity	Confidence
Smothering	Intermediate	High	Low	Low

The impact of smothering would depend on the time of year when it occurred. If smothering took place in winter, the microscopic gametophytes of *Chorda filum* would be buried. Although the gametophytes are more than likely to be tolerant of darkness (see turbidity), the reduction in oxygen often associated with smothering may lead to gametophytes rotting. At the very least, it may delay the microscopic gametophytes from germinating. If smothering occurred between April and November, when the large sporophytes are present, the impact would be lessened because some of the fronds would escape burial. Indeed, plants are often found with their holdfasts buried in sand or mud. Overall, intolerance has been assessed as intermediate to reflect the possibility that some gametophytes may be lost which would lead to a reduced population size the following year. Recruitment rates of the species are not known, however it has a fast growth rate and high fecundity and recovery rates are probably high.

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

The presence of silt on fronds would reduce light available for photosynthesis and lower growth rates. However, the species naturally occurs in places of high siltation, such as estuaries, so the species is likely to be tolerant of this factor.

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

Chorda filum is likely to be tolerant of a reduction in suspended sediment and may even benefit from an decrease in light attenuation (see turbidity).

	Intolerance	Recoverability	Sensitivity	Confidence
Dessication	High	High	Moderate	High

Chorda filum is likely to be highly intolerant of desiccation since it normally occurs in the shallow sublittoral or in rock pools. Recruitment rates of the species are not known, however it has a fast growth rate and high fecundity and recovery rates are probably high.

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

Chorda filum would probably be highly intolerant of an increase emergence because it cannot withstand desiccation. Recruitment rates of the species are not known, however it has a fast growth rate and high fecundity and recovery rates are probably high.

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

At the level of the benchmark *Chorda filum* is likely to be tolerant* of a decrease in emergence as the extent of the population may increase providing suitable substratum was available.

Increase in water flow rate	Intermediate	High	Low	Moderate

An increase in water flow may cause the substratum, with the plants attached, to be moved. If the substratum is moved to suitable conditions for growth of *Chorda filum* the plants will survive. However, the plants may be carried away to areas where the conditions are unsuitable for the alga's growth, for example, into areas deeper than the compensation zone for photosynthesis. In this case, the plants would die. An intolerance of intermediate has been suggested to reflect the likelihood that some plants will be lost to unsuitable areas. Recruitment rates of the species are not known, however it has a fast growth rate and high fecundity and recovery rates are probably high.

Decrease in water flow rate	High	High	Moderate	High

A decrease in water flow at the benchmark level could result in the plants being in areas with negligible water flow. In this case, the plants would probably die (S. Kraan, pers. comm.) and therefore, intolerance has been assessed as high. Recruitment rates of the species are not known, however it has a fast growth rate and high fecundity and recovery rates are probably high.

Increase in temperature	Low	High	Low	Low

The species lives in rock pools, where it is exposed to wide fluctuations in temperature. It occurs from Spitsbergen to northern Portugal and does not appear to form ecotypes that vary in thermal response over its distribution range (Breeman, 1988). It is well within its temperature range in the UK and would probably not be affected by a change in 5 °C.

Decrease in temperature	Low	High	Low	Low

The species lives in rock pools, where it is exposed to wide fluctuations in temperature. It occurs from Spitsbergen to northern Portugal and does not appear to form ecotypes that vary in thermal response over its distribution range (Breeman, 1988). It is well within its temperature range in the UK and would probably not be affected by a change in 5 °C.

Increase in turbidity	Low	Immediate	Not sensitive	Moderate

Turbidity would reduce light available for photosynthesis and lower growth rates. It may also reduce the maximum depth at which *Chorda filum* can grow. However, at the benchmark level it is unlikely that the population would be adversely affected and, therefore, low intolerance has been suggested. On return to normal turbidity levels the growth rate would be quickly restored.

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

A decrease in turbidity may lead to enhanced growth rate as a result of decreased light attenuation. The lower extent of the population may also be extended as the depth of compensation point for photosynthesis may also become deeper. Tolerant* has been suggested.

Increase in wave exposure	High	High	Moderate	Moderate

Chorda filum is most common at sheltered sites. An increase in wave exposure above this could tear plants off the substratum or move the substratum with the plants attached. If the substratum was moved to conditions suitable for growth of the algae the species could continue growing. However, the substratum could be removed to deeper water where conditions are unsuitable for the alga's growth. An increase in wave exposure could also lead to a shift in the type of sediment, removing suitable substrata for *Chorda filum*. Recruitment rates of the species are not known, however it has a fast growth rate and high fecundity and recovery rates are probably high.

Decrease in wave exposure	Not relevant	Not relevant	Not relevant	Moderate

Chorda filum can be found in sheltered and very sheltered habitats and, therefore, a decrease in wave exposure is not thought to be relevant.

Noise	Tolerant	Not relevant	Not sensitive	High

Seaweeds have no known mechanism for perception of noise

Visual Presence	Tolerant	Not relevant	Not sensitive	High

Seaweeds have no known mechanism for visual perception.

Abrasion & physical disturbance	Intermediate	High	Low	Low

Physical disturbance equivalent to a passing scallop dredge (see benchmark) is likely to remove a proportion of the population. Therefore, an intolerance or intermediate has been recorded. Recruitment rates of the species are not known, however it has a fast growth rate and high fecundity and recovery rates are probably high.

Displacement	High	High	Moderate	Moderate

Chorda filum can survive being displaced, if the substratum moves with the plants attached. Stormy weather can transport plants attached to sediment to more sheltered locations where they continue growing (South & Burrows, 1967). However, *Chorda filum* cannot tolerate displacement if it is removed from the substratum (see substratum loss). Recruitment rates of the species are not known, however it has a fast growth rate and high fecundity and recovery rates are probably high.

Chemical Pressures

	Intolerance	Recoverability	Sensitivity	Confidence
Synthetic compound contamination		Not relevant		Not relevant

Other seaweeds in the same order e.g. *Laminaria digitata* have been shown to be of intermediate intolerance to synthetic chemical contamination. However, insufficient information was available to assess the sensitivity of *Chorda filum*.

Heavy metal contamination		Not relevant		Not relevant

Other seaweeds in the same order e.g. *Saccharina latissima* have been shown to be of intermediate intolerance to synthetic chemical contamination. However, insufficient information was available to assess the sensitivity of *Chorda filum*.

Hydrocarbon contamination		Not relevant		Not relevant

Saccharina latissima, *Laminaria digitata* and *Laminaria hyperborea* have all been assessed as being of low intolerance to hydrocarbon contamination. However, insufficient information was available to assess sensitivity.

Radionuclide contamination		Not relevant		Not relevant

Insufficient information.

Changes in nutrient levels	Intermediate	High	Low	Low

Nutrients are essential for the growth of the alga. A decrease in nutrient levels would reduce growth rates. A slight increase in the level of nutrients may enhance growth, but high levels of nutrients may cause overgrowth of the alga by ephemeral green seaweed (Fletcher, 1996). Recruitment rates of the species are not known, however it has a fast growth rate and high fecundity and recovery rates are probably high.

Increase in salinity	Not relevant	Not relevant	Not relevant	Moderate

Chorda filum can be found in full salinity environments and therefore a further increase in salinity is unlikely. Therefore, not relevant has been recorded.

Decrease in salinity	Low	High	Low	

The species is found in low salinity environments such as estuaries and the Baltic and has been successfully cultured at salinities as low as 5 psu (Norton & South, 1969). It is also found in lagoonal habitats with low salinity (for example, see biotope SIR.FChoG). However, plants from fully saline conditions decay on immersion in freshwater (Russell, 1985). Overall, intolerance has been assessed as low. Recruitment rates of the species are not known, however it has a fast growth rate and high fecundity and recovery rates are probably high.

Changes in oxygenation		Not relevant		Not relevant

Insufficient information

Biological Pressures

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

Insufficient information

	Intolerance	Recoverability	Sensitivity	Confidence
Introduction of non-native species	Intermediate	High	Low	High

The Japweed *Sargassum muticum* may have displaced *Chorda filum* from unstable habitats (Hill *et al*., 1998).

	Intolerance	Recoverability	Sensitivity	Confidence
Extraction of this species	Intermediate	High	Low	Low

Little evidence has been found on the impact of extraction of *Chorda filum*. However, if removed recovery should be rapid. The species is an annual and recruitment rates are likely to be high so recovery is expected to take place within a year or two.

	Intolerance	Recoverability	Sensitivity	Confidence
Extraction of other species		Not relevant		Not relevant

Insufficient information

Additional information

Importance review

Policy/legislation

- no data -

Status

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

Non-native

Native	-		
Origin	-	**Date Arrived**	-

Importance information

Chorda filum is used fresh as a foodstuff but only in Japan.The sporophytes may support a rich epiflora and epifauna. The most common epiflora include *Acrochaete repens*, *Bolbocoleon piliferum* and *Ectocarpus siliculosus*. Common epifauna include *Lacuna vincta*, *Natica* spp. and *Spirorbis spirorbis*.The epiphytes may cause considerable damage to the sporophytes.

Bibliography

Breeman, A.M., 1988. Relative importance of temperature and other factors in determining geographic boundaries of seaweeds: experimental and phenological evidence. *Helgoländer Meeresuntersuchungen*, **42**, 199-241.

Fletcher, R.L., 1996. The occurrence of 'green tides' - a review. In *Marine Benthic Vegetation. Recent changes and the Effects of Eutrophication* (ed. W. Schramm & P.H. Nienhuis). Berlin Heidelberg: Springer-Verlag. [Ecological Studies, vol. 123].

Guiry, M.D. & Blunden, G., 1991. *Seaweed Resources in Europe: Uses and Potential.* Chicester: John Wiley & Sons.

Guiry, M.D. & Nic Dhonncha, E., 2002. AlgaeBase. World Wide Web electronic publication http://www.algaebase.org,

Hardy, F.G. & Guiry, M.D., 2003. *A check-list and atlas of the seaweeds of Britain and Ireland.* London: British Phycological Society

Norton, T.A. & South, G.R., 1969. Influence of reduced salinity on the distribution of two laminarian algae. *Oikos*, **20**, 320-326

Russell, G., 1985. Some anatomical and physiological differences in *Chorda filum* from coastal waters of Finland and Great Britain. *Journal of the Marine Biological Association of the United Kingdom*, **65**, 343-349.

South, G.H. & Burrows, E.M., 1967. Studies on marine algae of the British Isles. 5. *Chorda filum* (l.) Stckh. *British Phycological Bulletin*, **3** , 379-402.

Datasets

Centre for Environmental Data and Recording, 2018. Ulster Museum Marine Surveys of Northern Ireland Coastal Waters. Occurrence dataset https://www.nmni.com/CEDaR/CEDaR-Centre-for-Environmental-Data-and-Recording.aspx accessed via NBNAtlas.org on 2018-09-25.

Cofnod – North Wales Environmental Information Service, 2018. Miscellaneous records held on the Cofnod database. Occurrence dataset: https://doi.org/10.15468/hcgqsi accessed via GBIF.org on 2018-09-25.

Environmental Records Information Centre North East, 2018. ERIC NE Combined dataset to 2017. Occurrence dataset: http://www.ericnortheast.org.uk/home.html accessed via NBNAtlas.org on 2018-09-38

Fenwick, 2018. Aphotomarine. Occurrence dataset http://www.aphotomarine.com/index.html Accessed via NBNAtlas.org on 2018-10-01

Fife Nature Records Centre, 2018. St Andrews BioBlitz 2014. Occurrence dataset: https://doi.org/10.15468/erweal accessed via GBIF.org on 2018-09-27.

Fife Nature Records Centre, 2018. St Andrews BioBlitz 2015. Occurrence dataset: https://doi.org/10.15468/xtrbvy accessed via GBIF.org on 2018-09-27.

Fife Nature Records Centre, 2018. St Andrews BioBlitz 2016. Occurrence dataset: https://doi.org/10.15468/146yiz accessed via GBIF.org on 2018-09-27.

Kent Wildlife Trust, 2018. Kent Wildlife Trust Shoresearch Intertidal Survey 2004 onwards. Occurrence dataset: https://www.kentwildlifetrust.org.uk/ accessed via NBNAtlas.org on 2018-10-01.

Manx Biological Recording Partnership, 2017. Isle of Man wildlife records from 01/01/2000 to 13/02/2017. Occurrence dataset: https://doi.org/10.15468/mopwow accessed via GBIF.org on 2018-10-01.

Manx Biological Recording Partnership, 2018. Isle of Man historical wildlife records 1995 to 1999. Occurrence dataset: https://doi.org/10.15468/lo2tge accessed via GBIF.org on 2018-10-01.

Merseyside BioBank., 2018. Merseyside BioBank (unverified). Occurrence dataset: https://doi.org/10.15468/iou2ld accessed via GBIF.org on 2018-10-01.

National Trust, 2017. National Trust Species Records. Occurrence dataset: https://doi.org/10.15468/opc6g1 accessed via GBIF.org on 2018-10-01.

NBN (National Biodiversity Network) Atlas. Available from: https://www.nbnatlas.org.

OBIS (Ocean Biogeographic Information System), 2019. Global map of species distribution using gridded data. Available from: Ocean Biogeographic Information System. www.iobis.org. Accessed: 2019-03-21

Outer Hebrides Biological Recording, 2018. Non-vascular Plants, Outer Hebrides. Occurrence dataset: https://doi.org/10.15468/goidos accessed via GBIF.org on 2018-10-01.

Royal Botanic Garden Edinburgh, 2018. Royal Botanic Garden Edinburgh Herbarium (E). Occurrence dataset: https://doi.org/10.15468/ypoair accessed via GBIF.org on 2018-10-02.

South East Wales Biodiversity Records Centre, 2018. SEWBReC Algae and allied species (South East Wales). Occurrence dataset: https://doi.org/10.15468/55albd accessed via GBIF.org on 2018-10-02.