Breadcrumb sponge (*Halichondria (Halichondria) panicea*)

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/1407]. All terms and the MarESA methodology are outlined on the website (https://www.marlin.ac.uk)

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***Halichondria (Halichondria) panicea* at West Hoe, Plymouth.**
Photographer: Keith Hiscock
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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	Dr Keith Hiscock	**Refereed by**	Dr Rob van Soest
Authority	(Pallas, 1766)		
Other common names	-	**Synonyms**	*Halichondria panicea*

Summary

Description

The morphology of *Halichondria panicea* can be highly variable. Most commonly found on the open coast, it can form a low crust with 'volcano' like exhalent openings (osculae). In wave sheltered areas, the species may grow into a massive form up to 20 cm thick, and in tidal rapids or sounds may be several metres across. Vethaak *et al.* (1982) recorded a specimen that measured ca 60 cm across and 25 cm high in the Oostershelde, although most specimens are rarely this big. Colonies are sometimes composed of connecting (anastomose) lobes or digits. On the shore and in shallow depths, it may be green due to the presence of algal symbionts in the tissue. In the shade and deeper water or in winter it is cream-yellow in colour. *Halichondria panicea* smells strongly of seaweed.

Recorded distribution in Britain and Ireland

Present all around Britain and Ireland.

Global distribution

Recorded in the North Atlantic from the Barents Sea to the Mediterranean but not extending far into the Baltic.

Habitat

Halichondria panicea is found in damp habitats on the shore including rock pools, under boulders and overhangs. Underwater, it is particularly abundant in wave exposed or tide-swept situations often dominating kelp stipes or *Halidrys siliquosa* (sea oak). In low or variable salinity, it is likely to colonize foliose red algae.

Depth range

Intertidal to ca 569 m

Identifying features

- Very variable in form.
- Usually encrusting with a smooth to slightly rough surface and prominent osculae often raised above the surface.
- Can be olive-green (with symbiotic algae), orange-yellow and winter specimens can be creamy-yellow in colour.
- The spicules are elongated, slender, spindle formed, a little curved or bent in the middle, and very gradually pointed

Additional information

Halichondria panicea occurs on kelp stipes where it may dominate in tidal rapids and on other algae such as *Halidrys siliquosa* (sea oak). In low or variable salinity (for instance, in the western Baltic), it may be found encrusting predominantly on red algae such as *Phyllophora* sp. and *Phycodrys* sp. (Barthel, 1988). *Halichondria panicea* was found growing on tunicates (especially the invasive leathery sea squirt *Styela clava*) and molluscs in the Oosterschelde.

Listed by

Further information sources

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Biology review

Taxonomy

Phylum	Porifera	Sponges
Class	Demospongiae	Siliceous sponges
Order	Suberitida	
Family	Halichondriidae	
Genus	Halichondria	
Authority	(Pallas, 1766)	
Recent Synonyms	Halichondria panicea	

Biology

Typical abundance	Low density
Male size range	5-20 cm
Male size at maturity	Data deficient
Female size range	5-20 cm
Female size at maturity	Data deficient
Growth form	Cushion
Growth rate	See additional information
Body flexibility	None (less than 10 degrees)
Mobility	Sessile
Characteristic feeding method	Active suspension feeder
Diet/food source	Omnivore, Planktotroph
Typically feeds on	Phytoplankton
Sociability	Colonial
Environmental position	Epilithic, Epiphytic
Dependency	Independent.
Supports	Host Symbiotic algae
Is the species harmful?	No

Biology information

Growth rate

Under optimal conditions, Vethaak *et al.* (1982) recorded a mean length increase of 0.8 mm / day in summer and 0.2 mm / day in winter. It should be noted that this figure was a mean of six specimens. In terms of percentage increase in area, Barthel (1988) recorded a 1.6% increase in area per day and an increase in mean organic body mass of 100-240% between March and August in the western Baltic. Leichler & Witman (1997) recorded growth rates of about 5% per week with highest growth rates in lower currents in the Gulf of Maine.

Growth form

Vethaak *et al.* (1982) described six distinct forms (as well as intermediate forms) including apparently free-living forms, low incrusting forms and massive forms with elaborate 'chimneys' (see Vethaak *et al*., 1982 for further details and photographs).

Habitat preferences

Physiographic preferences	Enclosed coast / Embayment, Estuary, Isolated saline water (Lagoon), Open coast, Ria / Voe, Sea loch / Sea lough, Strait / sound
Biological zone preferences	Lower circalittoral, Lower eulittoral, Lower infralittoral, Mid eulittoral, Sublittoral fringe, Upper circalittoral, Upper infralittoral
Substratum / habitat preferences	Cobbles, Large to very large boulders, Small boulders
Tidal strength preferences	No information
Wave exposure preferences	Exposed, Extremely exposed, Ultra sheltered
Salinity preferences	Full (30-40 psu), Reduced (18-30 psu), Variable (18-40 psu)
Depth range	Intertidal to ca 569 m
Other preferences	
Migration Pattern	Non-migratory / resident

Habitat Information

Halichondria panicea occurs in the intertidal zone to over 500 m. Burton (1959, cited in Vethaak *et al*., 1982) considered *Halichondria panicea* to be cosmopolitan in its distribution. Alander (1942, cited in Vethaak *et al*., 1982) recorded *Halichondria panicea* at 569 m depth off the Swedish coast.

Life history

Adult characteristics

Reproductive type	See additional information
Reproductive frequency	Annual episodic
Fecundity (number of eggs)	No information
Generation time	<1 year
Age at maturity	No information
Season	April - June
Life span	3-5 yrs

Larval characteristics

Larval/propagule type	Planula
Larval/juvenile development	Lecithotrophic, Ovoviviparous
Duration of larval stage	No information
Larval dispersal potential	No information
Larval settlement period	Insufficient information

Life history information

Witte *et al.* (1994) found that *Halichondria panicea* had a seasonally distinct, very short, reproductive period in the Kiel Bight, Western Baltic. Oogenesis started in late summer/early autumn and oocytes developed overwinter. Spermatogenesis occurred when mature oocytes were formed and larvae were released in the spring through to June. However, Wapstra & van Soest (1987) reported that *Halichondria panicea* contained oocytes all year round in the Oosterschelde although embryos were only observed between May and September. They reported the species as being hermaphrodite although it was not stated whether or not the sponge was a permanent hermaphrodite or whether it exhibited protandrous or protogynous hermaphroditism. In the same area, Vethaak *et al. (*1982) found, comparably, that large oocytes and embryos were present from mid-May until mid-August coinciding with an increase in water temperature from 12°C to ca 19°C. Vethaak *et al.* (1982) also observed that, in the field, newly settled colonies were apparent within one year, i.e. the following May. Wapstra & van Soest (1987) noted that the reproductive cycle in *Halichondria panicea* may vary considerably between areas. A lifespan of about 3 years was suggested in Fish & Fish (1996). Unlike *Halichondria bowerbanki*, *Halichondria panicea* survive the winter in a normal, active state in the Oosterschelde (Vethaak *et al.*, 1982).

The information in this section is taken from Wapstra & van Soest (1987) whose study focussed on demosponges from the Oosterschelde. Measurements of *Halichondria panicea* from the Oosterschelde revealed that larvae varied from 180 by 340 mm up to 150 by 600 mm. In general, larval were oval in shape when released. This oval form was associated with the swimming stage. Within a matter of hours, the larvae changed to a more oblong shape and this change was conducive to gliding which occurred just before settlement. Occasionally, some larvae were already oblong upon release in which case they started to glide immediately. The larvae were also found to be capable of reverting back to the oval form from the oblong form in response to disturbance although it was not stated whether continued disturbance could delay settlement. Larvae are ciliated over their entire surface and a tuft of longer cilia could be found at the posterior end. Settlement was reported to have occurred within three days of release.

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	Moderate

Vethaak *et al.*,(1982) recorded apparently free-living forms of *Halichondria panicea* rolling around on the seabed near Dogger Bank in the North Sea although it is not known whether these specimens had once been attached and survived displacement from the substratum. It is most likely that sponges attached to the substratum are unlikely to survive substratum loss. However, settlement of new colonies is likely within one year and growth rate is rapid. Therefore, intolerance and recoverability have been recorded as high.

	Intolerance	Recoverability	Sensitivity	Confidence
Smothering	High	High	Moderate	Low

It is unlikely that *Halichondria panicea* will survive smothering for any significant length of time as the colony relies on water movement for respiration and has no mechanism for expanding above smothering material. Although the sponge has a mechanism for sloughing off their complete outer tissue layer together with any debris (Bartel & Wolfrath, 1989) there is probably an energetic cost in clearing sediment from tissues. Furthermore, Vethaak *et al.* (1982) reported that *Halichondria panicea* were rarely found in silt covered areas in the Oosterschelde. Therefore an intolerance of high has been recorded. However, settlement of new colonies is likely within one year and growth rate is rapid. Hence, a recoverability of high has been recorded.

	Intolerance	Recoverability	Sensitivity	Confidence
Increase in suspended sediment	Low	Immediate	Not sensitive	Moderate

Halichondria panicea lives in situations such as the entrance to estuaries and in straits where suspended sediment levels and settlement of silt is often high. The sponge has a mechanism for sloughing off their complete outer tissue layer together with any debris (Bartel & Wolfrath, 1989). It is expected that the sponge can, therefore, cope with increased siltation rates and suspended sediment. However, there is probably an energetic cost in clearing sediment from tissues and therefore, an intolerance of low has been recorded.

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

The sponge may derive some benefit from organic matter as food in the suspended sediment but there is probably an energetic cost in clearing sediment from tissues. On balance, this species has been assessed as tolerant.

	Intolerance	Recoverability	Sensitivity	Confidence
Dessication	Intermediate	Very high	Low	Moderate

Halichondria panicea is able to withstand some desiccation, in part because the tissue holds water. However, damage may occur if desiccation levels increase from those to which established individuals are normally exposed. Bleaching and tissue death is likely at the edges of the colony but re-growth will most likely occur.

Increase in emergence regime	Intermediate	Very high	Low	Low

Desiccation is likely to be the main impact of increased emergence. Established colonies may however survive but not thrive. The sponge is able to withstand some desiccation in part because the tissue holds water. However, damage may occur if desiccation levels increase from those to which established individuals are normally exposed. Bleaching and tissue death is likely at the edges of the colony but re-growth will most likely occur.

Decrease in emergence regime	Tolerant	Not relevant	Not sensitive	Moderate

The species occurs in the subtidal so that a decrease in emergence that makes intertidal colonies subtidal will benefit the species. However, in the subtidal, colonies may be subject to greater predation and so, on balance, tolerant is suggested.

Increase in water flow rate	Intermediate	Very high	Low	Low

In the Oosterschelde, Vethaak *et al.* (1982) reported that the biomass of *Halichondria panicea* was extremely high in stream gullies in the sublittoral associated with high water flow rates. In the case of increased water flow rates, low-lying colonies are unlikely to be adversely affected and may grow to a large size (favourable effect). However, poorly attached massive growths may be torn-off or swept away. Mortality is unlikely to be total and repair (see Bowerbank, 1857) and re-growth will occur once water flow rates return to normal. Growth is rapid (about 5% increase per week: Barthel, 1988).

Decrease in water flow rate	Low	Immediate	Not sensitive	Low

A reduction in water flow rates in situations sheltered from wave action will most likely have an adverse effect on at least a proportion of colonies through reduced food supply and possible local deoxygenation. However, it is not thought that this would result in death and, therefore, an intolerance of low has been recorded.

Increase in temperature	Low	Very high	Very Low	Moderate

Halichondria panicea has a wide distribution in the north-east Atlantic with Britain and Ireland central to that distribution so that the species exists well-within its normal temperature survival range.

Decrease in temperature	Low	Very high	Very Low	Moderate

Halichondria panicea has a wide distribution in the north-east Atlantic with Britain and Ireland central to that distribution so that the species exists well-within its normal temperature survival range. However, Crisp (1964) noted that colonies were damaged by frost during the 1963/64 winter. Recovery from surviving tissue is likely to be rapid and re-colonization will occur from annual recruitment from the plankton.

Increase in turbidity	Tolerant*	Not relevant	Not sensitive*	Moderate

Halichondria panicea occurs in low light levels. Furthermore, Vethaak *et al.* (1982) reported that *Halichondria panicea* had much higher population densities on shaded / totally dark surfaces than on well lit ones. The symbiotic algae that occur in the tissue in intertidal and shallow subtidal situations are likely to at least decline in abundance as a result of higher turbidity levels but not affect the survival of the sponge. Overall, tolerant* has been suggested.

Decrease in turbidity	Tolerant	Not relevant	Not sensitive	Moderate

Halichondria panicea occurs in low light levels. The symbiotic algae that occur in the tissue in intertidal and shallow subtidal situations are likely to increase in abundance as a result of lower turbidity levels but this will not affect the survival of the sponge and tolerant has been suggested.

Increase in wave exposure	Intermediate	Very high	Low	Moderate

Colonies of *Halichondria panicea* require water movement, whether wave action or tidal streams and, where wave exposure increases, some large and poorly attached colonies may be displaced by the wave action. The shape of sponge colonies is greatly influenced by the hydrodynamics of the environment and in high stress environments (such as high wave exposure), the sponges are often undersized or encrusting (Vethaak *et al.*, 1982). Overall, intolerance has been assessed as intermediate as biomass is expected to decrease. However, the growth rate is rapid (about 5%; increase per month: Barthel 1988) and recovery would be expected to occur quickly after reversion to previous conditions.

Decrease in wave exposure	Low	Very high	Very Low	Moderate

Colonies of *Halichondria panicea* require water movement, whether wave action or tidal streams. Reduction in wave exposure at sites where tidal streams are slight or absent may result in at least a reduction in growth and therefore an intolerance of low is suggested.

Noise	Tolerant	Not relevant	Not sensitive	High

Sponges have no known receptors for noise.

Visual Presence	Tolerant	Not relevant	Not sensitive	High

Sponges have no known visual receptors.

Abrasion & physical disturbance	Intermediate	High	Low	Moderate

The sponge is attached to the substratum and is unlikely to survive abrasion and physical disturbance. Therefore, an intolerance of intermediate is suggested. However, where merely damaged, repair occurs very rapidly (Bowerbank, 1857) whilst the settlement of new colonies is likely within one year and the growth rate is rapid. Sponges may also regrow from tissue remaining in crevices or other irregularities and that were not affected by the abrasion.

Displacement	High	High	Moderate	High

The sponge is attached to the substratum and is unlikely to survive being detached and displaced even though it remains in the area unless the location is very sheltered from disturbing conditions such as wave action. However, settlement of new colonies is likely within one year and growth rate is rapid. Sponges may also regrow from tissue remaining in crevices or other irregularities and that were not affected by the displacement.

Chemical Pressures

	Intolerance	Recoverability	Sensitivity	Confidence
Synthetic compound contamination		Not relevant		Not relevant

Insufficient information

Heavy metal contamination		Not relevant		Not relevant

Insufficient information

Hydrocarbon contamination	Low	High	Low	Very low

Very little information has been found. It appears that *Halichondria panicea* survived in areas affected by the *Torrey Canyon* oil spill (Smith, 1968), although few observations were made. If mortality occurred, settlement of new colonies is likely within one year and growth rate is rapid.

Radionuclide contamination		Not relevant		Not relevant

Insufficient information

Changes in nutrient levels		Not relevant		Not relevant

Insufficient information

Increase in salinity	Low	High	Low	Moderate

Halichondria panicea is euryhaline, occurring from full to low salinity conditions. Although it was not found in a mesohaline (5-18) lagoon in the Oosterschelde, it did survive in a polyhaline (18-30) lagoon, albeit as a thin encrusting base (the effects of the siltation were thought to be responsible for this as opposed to the reduced salinity conditions). Settlement of new colonies is likely within one year and the growth rate is rapid.

	Intolerance	Recoverability	Sensitivity	Confidence
Decrease in salinity	Low	High	Low	Moderate

Halichondria panicea occurs from full to low salinity conditions and only prolonged exposure to fresh or almost fresh water is likely to result in mortality. Settlement of new colonies is likely within one year and growth rate is rapid.

	Intolerance	Recoverability	Sensitivity	Confidence
Changes in oxygenation	Intermediate	High	Low	Very low

Halichondria panicea lives in areas of flowing water, which suggests that it is likely to need a good supply of oxygen for survival. Cole *et al.* (1999) suggest possible adverse effects on marine species below 4 mg/l and probable adverse effects below 2 mg/l. However, no information was found concerning the tolerance of *Halichondria panicea* to changes in oxygenation. Settlement of new colonies is likely within one year and the growth rate is rapid.

Biological Pressures

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

No literature was found concerning diseases and parasites in *Halichondria panicea*. The sponge has a mechanism for sloughing off the outer tissue layer (Bartel & Wolfrath, 1989) which may also be a means of removing pathogens or epizooites.

	Intolerance	Recoverability	Sensitivity	Confidence
Introduction of non-native species				Not relevant

Insufficient information

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

No targeted extraction of this species is known. Were it to be extracted, it is expected that tissue would be left behind and would regrow. Growth rates of about 5% per week are likely (Barthel, 1988).

	Intolerance	Recoverability	Sensitivity	Confidence
Extraction of other species	High	High	Moderate	High

Halichondria panicea colonizes *Laminaria hyperborea* stipes and may thus be subject to harvesting effects. Sivertsen (1991; cited in Birkett *et al.*, 1998) showed that kelp populations stabilise after about 4-5 year post-harvesting and *Halichondria panicea* will settle readily so that recovery is likely to occur within a year or possibly more.

Additional information

Importance review

Policy/legislation

- no data -

Status

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

Non-native

Native	Native		
Origin	-	**Date Arrived**	-

Importance information

Halichondria panicea is likely to dominate hard substratum sublittoral habitats where tidal streams are very strong in wave sheltered conditions. *Halichondria panicea* is preyed on by sea slugs, e.g. *Archidoris pseudoargus* (Picton & Morrow, 1994).

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