Kaleidoscope jellyfish (*Haliclystus auricula*)

MarLIN – Marine Life Information Network
Marine Evidence–based Sensitivity Assessment (MarESA) Review

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The kaleidoscope jellyfish *Haliclystus auricula*.
Photographer: Marco Faasse
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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 Harvey Tyler-Walters & Ken Neal	**Refereed by**	Admin
Authority	James-Clark, 1863		
Other common names	-	**Synonyms**	-

Summary

Description

Haliclystus auricula is a funnel-shaped jellyfish up to 2-2.5 cm high with eight arms radiating from the mouth, connected near the tips by a thin membrane. It is fixed to the substratum by a stalk that is the same length as the bell. Colour varies from grey/green to red/brown. The arms are tipped by clusters of up to 100 short tentacles. The main distinguishing feature of *Haliclystus auricula* is the presence of kidney-shaped primary tentacles on the membrane margin, between the arms.

Recorded distribution in Britain and Ireland

Recorded from the Shetland Isles, Orkney, the west coasts of England, Ireland and Scotland, with isolated records from Northumberland.

Global distribution

Recorded from the west coast of Britain and Ireland (with isolated records from Northumberland), the Channel Isles (Guernsey) and isolated records on the west coast of the Atlantic, the North

Pacific, from Chile, South America, the Atlantic coast of Argentina, and the Arctic Ocean (Zagal, 2008; OBIS, 2017).

Habitat

Found on macroalgae and seagrasses in the mid intertidal and shallow sublittoral.

Depth range

Mid-eulittoral to shallow sublittoral

Identifying features

- The body resembles a funnel up to 2-2.5 cm in height with the stalk making up half the body length.
- Eight equally spaced arms radiating from the mouth.
- Eight regularly spaced clumps of tentacles at the tips of the arms around the rim of the funnel.
- Between the tentacle clumps are kidney-shaped primary tentacles known as 'anchors'.

Additional information

Miranda *et al*. (2010, 2016a&b) provide detailed studies of the morphology, histology and taxonomy of the Stauormedusae. Information on the ecology of *Haliclystus auricula* is limited. Information from similar species or other members of the group (Stauromedusae) was used to complete this review. Evidence relevant to sensitivity assessment was particularly lacking. Sensitivity assessments are based on proxies (e.g. the sensitivity of its preferred substratum) and expert judgement where possible. The sensitivity assessments may also vary with habitat, i.e. between macroalgal dominated hard rock and seagrass beds, and **the explanatory text for each assessment must be consulted.**

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Further information sources

Stauromedusae UK

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Biology review

Taxonomy

Phylum	Cnidaria	Sea anemones, corals, sea firs & jellyfish
Class	Staurozoa	Stalked jellyfish
Order	Stauromedusae	
Family	Haliclystidae	
Genus	Haliclystus	
Authority	James-Clark, 1863	
Recent Synonyms	-	

Biology

Typical abundance	High density
Male size range	2-2.5 cm
Male size at maturity	2-2.5 cm
Female size range	2-2.5 cm
Female size at maturity	2-2.5 cm
Growth form	Radial
Growth rate	No information
Body flexibility	High (greater than 45 degrees)
Mobility	Temporary attachment
Characteristic feeding method	Predator
Diet/food source	Carnivore
Typically feeds on	Copepods, amphipods, ostracods, small juvenile decapods, polychaetes and gastropods
Sociability	Not relevant
Environmental position	Epifloral, Epilithic
Dependency	None.
Supports	None
Is the species harmful?	No

Biology information

Population dynamics.
Stauromedusae are annuals that develop seasonally, reproduce, and die back until the following year, although they have a complex life cycle that may include resting or overwintering stages (see ‘life history’ below) (Berrill, 1962; Corbin, 1978,1979, Zagal, 2004a; Miranda *et al.*, 2012). Although the number of studies is limited, Stauromedusae exhibit seasonal periods of high abundance in both the northern and southern hemispheres (Miranda *et al.*, 2012, Table 2). In the Wembury, UK, Corbin (1978, 1979) noted that *Haliclystus auricula* exhibited its highest abundance in midsummer, *Calvadosia (as Lucernariopsis) campanulata* in autumn and *Calvadosia (as Lucernariopsis) cruxmelitensis* in winter, based on 23 years of observations. Between 1953 and 1974, Corbin (1979) also observed years with exceptionally high counts of *Calvadosia campanulata* in 1962 and 1974, of *Calvadosia cruxmelitensis* in 1968 and of *Haliclystus auricula* in 1972 and 1973 (when over 500

individuals of *Haliclystus auricula* were counted). The annual mean numbers of indivudals was 37 in *Haliclystus auricula*, 39 on *Calvadosia cruxmelitensis* but 5 in *Calvadosia campanulata* (Corbin, 1979). In southern Chile, Zagal (2004a) noted a summer peak in abundance in *Haliclytus auricula*, with a maximum density of 1,405 individuals/m^2, after which it disappeared in winter. The stauromedusae adult phase is the only conspicuous phase of the life cycle. Although it is small and often camouflaged on its algal substratum, the other life stages (planulae and stauropolyps) are small and hard to observe (Corbin, 1979; Miranda *et al*., 2012). The environmental cues for the seasonal growth and exceptional years are unknown but their abundance coincides with the greatest algal cover and is probably correlated with optimal conditions for feeding and hence growth (Zagal, 2004a; Miranda *et al*., 2012).

Feeding
Stauromedusae are passive predators that catch food using stinging nematocysts. In southern Chile, Zagal (2004b) reported that the prey of *Haliclystus auricula* consisted mainly of gammarid amphipods, chironomid fly larvae, ostracods (seed shrimp), juvenile decapods crustaceans and gastropods, and that the smaller medusae took the smallest prey. These prey are typical mobile grazers and scavengers in seaweed canopies. In South Georgia (subantarctic) *Haliclystus antarcticus* preyed mainly on calanoid copepods, amphipods and, in one case, an errant polychaete (Davenport, 1998). Davenport (1998) concluded that they took both benthic and planktonic prey.

Davenport (1998) also noted that *Haliclystus antarcticus* in South Georgia (subantarctic) was preyed on by aeolid nudibranchs and the fish *Notothenia rossii* (the marbled rock cod).

Habitat preferences

Physiographic preferences	Enclosed coast / Embayment, Strait / sound
Biological zone preferences	Lower eulittoral, Lower infralittoral, Mid eulittoral, Sublittoral fringe
Substratum / habitat preferences	Other species (see additional information), Seagrass
Tidal strength preferences	Weak < 1 knot (<0.5 m/sec.)
Wave exposure preferences	Exposed, Moderately exposed, Sheltered
Salinity preferences	Full (30-40 psu)
Depth range	Mid-eulittoral to shallow sublittoral
Other preferences	No text entered
Migration Pattern	

Habitat Information

Haliclystus auricula, *Calvadosia (as Lucernariopsis) cruxmelitensis* and *Calvadosia (as Lucernariopsis) campanulata* grow on a variety of macroalgae on the lower half of the shore, in pools or 'moving with the waves' 'at the tides edge' (Corbin, 1979). It was also recorded on *Zostera* (seagrass) around the Plymouth area (MBA, 1957; Corbin, 1978). In southern Chile, Zagal (2004b) recorded most specimens of *Haliclystus auricula* from *Ceramium rubrum*, *Gymnogonus furcellatus* and *Ulva sp.* although other seaweeds were also used. Small specimens (0.08-0.9 mm in umbrella height) had a preference for *Ceramium rubrum*, while larger sizes were observed on all three species. Zagal (2004b) also noted that *Haliclystus auricula* reached its highest abundance in the mid-littoral.

Life history

Adult characteristics

Reproductive type	Asexual, Gonochoristic (dioecious), Sexual
Reproductive frequency	Annual episodic
Fecundity (number of eggs)	No information
Generation time	1 year
Age at maturity	<1 year
Season	Summer to autumn
Life span	<1 year

Larval characteristics

Larval/propagule type	Planula
Larval/juvenile development	Lecithotrophic
Duration of larval stage	2-10 days
Larval dispersal potential	Very limited (<1 m)
Larval settlement period	Summer to autumn

Life history information

Stauromedusae have a potentially complex life cycle with sexual and asexual stages, although the larval and early stages have been observed in few genera (*Haliclystus* and *Stylocoronella*) (Miranda *et al*., 2010, 2012). In addition, Miranda *et al.* (2010) concluded that the hydrozoan *Microhydrula limopsicola* was a life-stage of *Haliclystus antarcticus* (based on morphology and molecular markers) and, therefore, suggested that the 'microhydrula' was part of the Stauromedusan life cycle.

- Individual medusae are dioecious. Spawning in *Haliclystus stejnegeri* was induced by exposure to light after an 8 hour dark period, while spawning was more intense in *Haliclystus salpinx* rather than induced under the same light regime (Otto, 1978).
- Eggs were in diameter 35 µm in *Haliclystus stejnegeri* and 40 µm in *Haliclystus salpinx* (Otto, 1978).
- Once fertilized the embryos become extremely sticky, stick to the substratum, and develop into planulae within 24 hours at 12-15°C (Otto, 1978).
- The non-ciliated benthic planulae settle within 1-3 days, on an available substratum, or already settled planulae, and many form aggregations of 1 to 8 planulae (Otto, 1978, 1979). They develop nematocysts within a week. In *Haliclystus octoradiatus* planulae settle in aggregations of 3-20 larvae (Miranda *et al*., 2010).
- Otto (1979) noted that in one culture, the planulae underwent cell division and developed gastric cavities after several weeks, but was unable to stimulate further development in culture.
- Miranda *et al.* (2010, 2012) suggest that the planulae develop into the microhydrula stage, which further develops into the stauropolyp (the juvenile or intermediate stauromedusa).
- The planula develops into the fully developed stauropolyp in ca 15 days in *Haliclystus octoradiatus* (Wietrzykowski, 1912; cited in Miranda *et al*., 2012).
- The stauropolyp develops apically into the stauromedusa (Kikinger & von Salvini-Plawen, 1995; Miranda *et al*., 2010, 2012), in about 2 months in *Stylocoronella* (Kikinger & von Salvini-Plawen, 1995).

Asexual reproduction can occur at several stages. The adult stauromedusa can bud ‘frustules’ from the upper part of the animal, while frustules can also bud from special tentacles on the stauropolyp and from the ‘microhydula’ stage (Kikinger & von Salvini-Plawen, 1995; Miranda *et al.*, 2010, 2012). Kikinger & von Salvini-Plawen (1995) noted that ‘frustules’ divided and then encysted, and suggested that they were ‘resting stages’. Otto (1979) also noted that the lack of further development within her cultures suggested that the larvae had entered an overwintering stage, especially as larvae did not develop immediately after settlement in the field. Miranda *et al.* (2012) suggested that the ‘microhydrula’ stage might represent the ‘resistant’ stage of Otto (1978).

Miranda *et al.* (2012) noted that stauromedusae appear in specific seasons and then disappear. Adults are small (1-4 cm) and often camouflaged against the background of macroalgae and their abundance may be underestimated (Corbin, 1979; Miranda *et al.*, 2012). However, the tiny planulae (ca 100 µm in length) and stauropolyps (0.3-0.8 mm in height) are more difficult to find and have only been documented for nine of the 51 known species of Stauromedusae (Miranda *et al.*, 2010). It was also suggested that there might be a subtidal 'reservoir' population (Gwilliam, 1956, cited in Miranda *et al.*, 2012). The ‘microhydrula’ stage of *Haliclystus anatarcticus* was collected at a depth of 31 m, and the stauropolyp of *Haliclystus octoradiatus* can detach itself from the substratum, even in calm water. However, no other evidence was found for seasonal migration of planulae, stauropolyps and stauromedusae to or from deeper water (Miranda *et al.*, 2012). Field observations suggest that Stauromedusae disappear for several months before the young stages appear, which suggests that encystment occurs in the field (Otto, 1979; Miranda *et al.*, 2012). Also, Wietrzykowski (1912, cited in Miranda *et al.*, 2012) noted young polyps in April and mature stauromedusae in July. Miranda *et al.* (2012) concluded that three months from December to March would be adequate for planulae to become mature stauromedusae.

In addition, although a single stauropolyp only develops into a single adult (sexual) stauromedusae, the ‘microhydula’ and ‘stauropolyp’ stages can create numerous asexual ‘frustules’. Frustules and planulae provide the potential to create a 'resevoir' of resistant or overwintering stages (Otto, 1978, 1979; Kikinger & von Salvini-Plawen, 1995; Miranda *et al.*, 2010) towards the end of the season, which may then develop when favourable conditions return the following year resulting in the seasonal peak in abundance. But frustules 'from asexual reproduction' may also rapidly develop many new polyps, contributing to the seasonal peaks in abundance, and in particular, exceptional ‘blooms’ in some years (Miranda *et al.*, 2012). Miranda *et al.* (2010) also noted that intense asexual reproduction was consistent with the low genetic diversity of the *Haliclystus antarcticus* populations they studied and, provide Stauromedusae with the potential to develop large populations in isolated areas.

Sensitivity review

Resilience and recovery rates

Stauromedusae are sedentary and spend their lives attached to the substratum, although they can attach to seaweeds and plants with their tentacles and adhesive disks and undertake limited locomotion. Their planulae are benthic and non-ciliated, as are the rest of their life stages (Otto, 1978, 1979; Miranda *et al*., 2012) so that dispersal is limited. However, benthic life stages have been recorded in the subtidal and stauropolyps may detach (Miranda *et al*., 2012). Therefore, it is probable that water flow and wave action may be important for dispersal (authors comment) although no evidence was found.

Although a single stauropolyp only develops into a single adult (sexual) stauromedusae, the ‘microhydula’ and ‘stauropolyp’ stages can create numerous asexual ‘frustules’. Frustules and planulae provide the potential to create a ‘resevoir’ of resistant or overwintering stages (Otto, 1978, 1979; Kikinger & von Salvini-Plawen, 1995) towards the end of the season, which may then develop when favourable conditions return the following year resulting in the seasonal peak in abundance. But frustules (from asexual reproduction) may also rapidly develop many new polyps, contributing to the seasonal peaks in abundance, and in particular, exceptional ‘blooms’ in some years (Corbin, 1979; Miranda *et al*., 2012). Miranda *et al*. (2010) also noted that intense asexual reproduction was consistent with the low genetic diversity of the *Haliclystus antarcticus* populations they studied and, provide Stauromedusae with the potential to develop large populations in isolated areas. This may also explain why Stauromedusae in the UK are locally abundant but nationally uncommon or rare (depending on species).

Hiscock *et al*. (2011, 2013) noted that *Haliclystus auricula*, *Calvadosia cruxmelitensis* and *Calvadosia campanulata* had declined, markedly in parts of the south-west compared to their abundance between the 1950s and 1970s (Corbin, 1979), and were 'little seen' in the UK. As a result, *Haliclystus auricula* was regarded 'uncommon', *Calvadosia campanulata* was regarded as 'scarce' and *Calvadosia cruxmelitensis* was regarded as 'rare' in the UK. Hiscock *et al*. (2011) suggested that the loss of seagrass beds or other habitat may have contributed to the decline but that the reason for the decline was unknown.

Annual increases in abundance and occasional exceptional 'natural true blooms' (*sensu* Miranda *et al*., 2012) have been recorded in several Stauromedusae. It is suggested that the early life stages of the Stauromedusae provide a 'reservoir' of overwintering and resistant stages (as above) that persist in the environment awaiting favourable conditions for growth of the sexual stauromedusae stage. It is possible that the 'reservoir' of early life-stage may persist (e.g. via asexual reproduction or resistant stages) for many years awaiting favourable conditions. It may also be possible that this 'reservoir' exists in the subtidal, and that early life stages may be dispersed passively (by water flow and wave action) (authors comments). However, the lack of information on the ecology of the Stauromedusae does not allow support a conclusion, at present (see Miranda *et al*., 2012).

Resilience assessment. *Haliclystus auricula* is an annual that can develop large populations quickly within the summer months only to die back in winter. The potential that numerous planulae and resistant frustules can overwinter, its short lifespan, together with the potential for asexual development in Stauromedusae suggests that recovery could be rapid. Therefore, where resistance is 'Medium' or 'Low', resilience is probably **'High'**. But, where a pressure results in severe impacts 'the loss of over 75% of the species population and modification of the habitat' and, hence, removal of the species substratum (i.e. macroalgae and seagrass) and any resident 'reservoir' of resistant or overwintering stages, recovery may be prolonged. Therefore, the resilience of *Haliclystus auricula* to severe impacts is discussed, where relevant, on a pressure by pressure basis. The resilience and, hence, sensitivity assessments may also vary with habitat, i.e. between macroalgal dominated hard rock and seagrass beds, and **the explanatory text for each assessment must be consulted.** The resilience assessment is based on evidence on the Stauromedusae as a whole, a scarcity of information on the ecology of this species, and a scarcity of any direct evidence of recovery in the field. Therefore, the confidence in the assessment is 'Low'.

Hydrological Pressures

	Resistance	Resilience	Sensitivity
Temperature increase (local)	High Q: Low A: NR C: NR	High Q: High A: High C: High	Not sensitive Q: Low A: Low C: Low

No evidence on the temperature tolerance of the Stauromedusae, and *Haliclystus auricula*, in particular, was found. It is recorded on both sides of the Atlantic in the northern hemisphere and ranges from the Arctic Ocean, south to the Azores (Zagal, 2008; OBIS 2017). It also occurs on seaweeds on the lower intertidal, although often protected by the seaweed from direct sunlight and hence desiccation (Corbin, 1979). Therefore, it is likely to resist a 2°C change in temperature over a period of a year in UK waters. It is a summer annual (Corbin, 1979) so that long-term changes in temperature may affect its seasonal growth and reproduction but the environmental factors that result in its seasonal abundance are not known (Corbin, 1979; Miranda *et al*., 2012). No information was found on the effect, if any, of short-term acute temperature change (e.g. by 5°C).

Sensitivity assessment. Therefore, it is probably resistant to a 2°C change in temperature over a period of a year in UK waters and a resistance of **'High'** is recorded, albeit with 'Low' confidence. Hence, resilience is assessed as **'High'** and the species is recorded as **'Not sensitive'** at the benchmark level.

	Resistance	Resilience	Sensitivity
Temperature decrease (local)	High Q: Low A: NR C: NR	High Q: High A: High C: High	Not sensitive Q: Low A: Low C: Low

No evidence on the temperature tolerance of the Stauromedusae, and *Haliclystus auricula*, in particular, was found. It is recorded on both sides of the Atlantic in the northern hemisphere and ranges from the Arctic Ocean, south to the Azores (Zagal, 2008; OBIS 2017). It also occurs on seaweeds on the lower intertidal, although often protected by the seaweed from direct sunlight and hence desiccation (Corbin, 1979). Therefore, it is likely to resist a 2°C change in temperature over a period of a year in UK waters. It is a summer annual (Corbin, 1979) so that long-term changes in temperature may affect its seasonal growth and reproduction but the environmental factors that result in its seasonal abundance are not known (Corbin, 1979; Miranda *et al*., 2012). No information was found on the effect, if any, of short-term acute temperature change (e.g. by 5°C).

Sensitivity assessment. Therefore, it is probably resistant to a 2°C change in temperature over a period of a year in UK waters and a resistance of **'High'** is recorded, albeit with 'Low' confidence. Hence, resilience is assessed as **'High'** and the species is recorded as **'Not sensitive'** at the benchmark level.

Salinity increase (local)	No evidence (NEv) Q: NR A: NR C: NR	Not relevant (NR) Q: NR A: NR C: NR	No evidence (NEv) Q: NR A: NR C: NR

Haliclystus auricula is recorded from full salinity conditions. It also occurs on seaweeds on the lower intertidal, although often protected by the seaweed from direct sunlight and hence desiccation that might result in localised increases in salinity (Corbin, 1979). It is also found in lower shore rockpools, which are unlikely to experience the range of salinities typical of upper shore rockpools. It is unlikely to be exposed to hypersaline (>40) conditions but hypersaline effluents are probably detrimental. However, no evidence was found on which to base an assessment.

Salinity decrease (local)	Low Q: Low A: NR C: NR	High Q: Medium A: Medium C: Medium	Low Q: Low A: Low C: Low

Haliclystus auricula is recorded from full salinity conditions. It also occurs on seaweeds on the lower intertidal, although often protected by the seaweed from direct sunlight (Corbin, 1979), although it may be exposed to rainfall and reduced salinity for short periods at low tide. It is also found in lower shore rockpools, which are unlikely to experience the range of salinities typical of upper shore rockpools. No evidence of salinity tolerance of the adult or other life stages was found. However, its position on the shore suggests that it could tolerate occasional rainfall at low tide but that a change from 'full' salinity to 'reduced' would be detrimental. Therefore, a resistance of **'Low'** is suggested, with 'Low' confidence. Resilience is probably 'High' so sensitivity is assessed as **'Low'.**

Water flow (tidal current) changes (local)	High Q: Low A: NR C: NR	High Q: High A: High C: High	Not sensitive Q: Low A: Low C: Low

Haliclystus auricula is recorded from the lower intertidal dominated by abundant fucoids and red seaweeds (e.g. *Chondrus* or *Gigartina*) and from seagrass beds (Corbin, 1979). It is, therefore, probably adapted to wave exposed to sheltered conditions in weak flow, that is, low to moderate energy habitats (see Connor *et al*., 2004). In addition, Clark (1878) noted that it needed some water flow in the laboratory. Fenwick (2017) also remarked that the Stauromedusae in Mounts Bay, Cornwall were most likely to occur close to a constriction in the runnels and interlinked pools of the bay where the water flow was increased locally. Therefore, a significant change in water flow may be detrimental, partly as the species may be removed but mainly as the seaweed or plant substrata it requires would be removed or lost. However, a 1-2% change in water flow (the benchmark) is not likely to be significant. Therefore, a resistance of **'High'** is recorded so that resilience is **'High'** and the species is probably **'Not sensitive'** at the benchmark level.

Emergence regime changes	Low Q: Low A: NR C: NR	High Q: Medium A: Medium C: Medium	Low Q: Low A: Low C: Low

Haliclystus auricula is recorded from the lower intertidal dominated by abundant fucoids and red seaweeds and from seagrass beds (Corbin, 1979). Lower shore populations are likely to be affected by changes in emergence. A decrease in emergence will probably provide additional habitat. However, an increase in emergence (for a year) will increase the potential for desiccation and reduce the cover of its required macroalgal substratum. Therefore, a resistance of **'Low'** is recorded. Resilience is probably **'High'** so that sensitivity is assessed as **'Low'.**

Wave exposure changes (local)	High Q: Low A: NR C: NR	High Q: High A: High C: High	Not sensitive Q: Low A: Low C: Low

Haliclystus auricula is recorded from the lower intertidal dominated by abundant fucoids and red seaweeds (e.g. *Chondrus* or *Gigartina*) and from seagrass beds (Corbin, 1979). It is, therefore, probably adapted to wave exposed to sheltered conditions in weak flow, that is, low to moderate energy habitats (see Connor *et al*., 2004). Therefore, a significant change in wave action (e.g. to very exposed) may be detrimental, partly as the species may be removed but mainly as the seaweed or plant substrata it requires would be reduced in abundance or lost, presumably together with any resistant stages or early life stages, depending on the season. However, a 3-5% change in significant wave height (the benchmark) is not likely to be significant. Therefore, a resistance of **'High'** is recorded so that resilience is **'High'** and the species is probably **'Not sensitive'** at the benchmark level.

Chemical Pressures

	Resistance	Resilience	Sensitivity
Transition elements & organo-metal contamination	Not Assessed (NA) Q: NR A: NR C: NR	Not assessed (NA) Q: NR A: NR C: NR	Not assessed (NA) Q: NR A: NR C: NR

This pressure is **Not assessed**.

Hydrocarbon & PAH contamination	Not Assessed (NA) Q: NR A: NR C: NR	Not assessed (NA) Q: NR A: NR C: NR	Not assessed (NA) Q: NR A: NR C: NR

This pressure is **Not assessed**.

Synthetic compound contamination	Not Assessed (NA) Q: NR A: NR C: NR	Not assessed (NA) Q: NR A: NR C: NR	Not assessed (NA) Q: NR A: NR C: NR

This pressure is **Not assessed**.

Radionuclide contamination	No evidence (NEv) Q: NR A: NR C: NR	Not relevant (NR) Q: NR A: NR C: NR	No evidence (NEv) Q: NR A: NR C: NR

No evidence was found.

Introduction of other substances	Not Assessed (NA) Q: NR A: NR C: NR	Not assessed (NA) Q: NR A: NR C: NR	Not assessed (NA) Q: NR A: NR C: NR

This pressure is **Not assessed**.

De-oxygenation	No evidence (NEv) Q: NR A: NR C: NR	Not relevant (NR) Q: NR A: NR C: NR	No evidence (NEv) Q: NR A: NR C: NR

Haliclystus and *Calvadosia* spp. have a preference for areas with flowing water, which suggests that low oxygen levels would be detrimental. However, no evidence was found.

Nutrient enrichment	Medium Q: Low A: NR C: NR	Medium Q: Low A: NR C: NR	Medium Q: Low A: NR C: NR

No information on the effects of nutrient enrichment on this species was found. However, its sensitivity is probably determined by the macroalgae and seagrass it requires for substratum.

Green algae species have been identified worldwide as species that occur in areas subject to increased nutrient input within the vicinity of sewage outfalls and at intermediately polluted sites (Littler & Murray, 1975; Bellgrove *et al*., 1997; Bellgrove *et al*., 2010).

Atalah & Crowe (2010) added nutrients to rockpools occupied by a range of algae including encrusting corallines, turfs of *Mastocarpus stellatus*, *Chondrus crispus* and *Corallina officinalis* and green and red filamentous algae. The invertebrates present were mostly *Patella ulyssiponensis*, the winkle *Littorina littorea* and the flat top shell *Gibbula umbilicalis*. Nitrogen and phosphorous enhancement was via the addition of fertilisers, as either 40 g/litre or 20 g/litre. The treatments were applied for seven month and experimental conditions were maintained every two weeks. The experimental treatments do not directly relate to the pressure benchmark but indicate some general trends in sensitivity. The cover of green filamentous algae was significantly increased both by reduced grazing and increased nutrients, although the effect size was synergistically magnified by the combined effect of grazer removal and nutrients. Nutrient enrichment caused an absolute increase in the average cover of green filamentous algae of 19% (±3.9 S.E.) respect to the control treatments while the cover of red turfing algae was not affected by nutrient addition (Atalah & Crowe, 2010).

However, nutrient enrichment is cited as a threat to seagrass beds globally. A typical response to nutrient enrichment is a decline in seagrass populations in favour of macroalgae or phytoplankton (Baden *et al*., 2003). The mechanisms responsible for seagrass decline under eutrophication are complex and involve direct and indirect effects relating to changes in water quality, smothering by macroalgal blooms (Den Hartog & Phillips, 2000), and competition for light and nutrients with epiphytic microalgae and with phytoplankton (Nienhuis, 1996). In the Mondego estuary (Portugal), eutrophication triggered serious biological changes, which led to an overall increase in primary production and to a progressive replacement of seagrass *Zostera noltei* beds by coarser sediments and opportunistic macroalgae (Cardoso *et al*., 2004a). Nutrients stimulate phytoplankton blooms that compete for nutrients but more importantly increase the turbidity and absorb light, reducing seagrass productivity (discussed in ‘changes in suspended solids’). In general terms, algae are able to out-compete seagrasses for water column nutrients since they have a higher affinity for nitrogen (Touchette & Burkholder, 2000). Short & Burdick (1996) found that excessive nitrogen loading stimulated the proliferation of algal competitors that caused shading and thereby stressed *Zostera* plants. Many seagrasses have a positive response to nitrogen and/or phosphorous enrichment (Peralta *et al*., 2003), but excessive loads can inhibit seagrass growth and survival, not only indirectly through light reduction resulting from increased algal growth but also directly in terms of the physiology of the seagrass. Direct physiological responses include ammonium toxicity and water column nitrate inhibition through internal carbon limitation (Touchette & Burkholder, 2000). In addition, Greening & Janicki (2006) found that in Florida, the USA, recovery of seagrass beds was incomplete 20 years after nutrient enrichment caused an eutrophication event.

Sensitivity assessment. *Haliclystus* and *Calvadosia* spp. can occur on a variety of macroalgae. In the intertidal hard rock habitats and rock pools, the macroalgal substratum for the species is unlikely to be removed by nutrient enrichment. Although the species may change in abundance adequate substratum is likely to be present, together with more grazers, on which the Stauormedusae may also feed (e.g. amphipods). Therefore, a resistance of **‘High’**, and a resilience of **‘High’** are recorded and the species is probably **‘Not sensitive’** at the benchmark level in intertidal hard rock habitats.

The loss of seagrass beds worldwide has been attributed to nutrient enrichment, due in part to the likeliness of smothering by epiphytes, and the effects of reduced light penetration caused by eutrophication. Seagrass beds are regarded as highly sensitive to nutrient enrichment. Therefore, the Stauromedusae within seagrass beds may also be lost. However, the benchmark of this pressure (compliance with WFD 'good' status) allows for a 30% loss of intertidal seagrass beds under the WFD criteria for good status. Therefore, at the level of the benchmark resistance of seagrass beds and hence the Stauromedusae that depend on the seagrass bed for substratum, to this pressure is assessed **'Medium'**. Resilience is assessed as **'Medium'** so that sensitivity is assessed as **'Medium'**.

Organic enrichment	Medium Q: Low A: NR C: NR	Medium Q: Low A: NR C: NR	Medium Q: Low A: Low C: Low

No information on the effects of organic enrichment on this species was found. However, its sensitivity is probably determined by the macroalgae and seagrass it requires for substratum.

Organic enrichment and nutrient enrichment commonly co-occur, for example, sewage deposits or outputs from fish farms may enhance nitrogen and phosphorous and organic matter. Nutrient enrichment alters the selective environment by favouring fast growing, ephemeral species such as *Ulva lactuca* and *Ulva intestinalis* (Berger *et al.*, 2004, Kraufvelin, 2007). Rohde *et al.* (2008) found that both free growing filamentous algae and epiphytic microalgae can increase in abundance with nutrient enrichment. This stimulation of annual ephemerals may accentuate the competition for light and space and hinder perennial species development or harm their recruitment (Berger *et al.*, 2003; Kraufvelin *et al.*, 2007). Nutrient enrichment can also enhance fouling of *Fucus* fronds by biofilms (Olsenz, 2011). Nutrient enriched environments can not only increase algae abundance but the abundance of grazing species (Kraufvelin, 2007). High nutrient levels may directly inhibit spore settlement and hinder the initial development of *Fucus vesiculosus* (Bergström *et al.*, 2003). Bellgrove *et al.* (2010) found that coralline turfs out-competed fucoids at a site associated with organic enrichment caused by an ocean sewage outfall. Therefore, in hard rock habitats, adequate substratum for the Stauromedusae is likely to remain so that resistance is recorded as **'High'**, resilience as **'High'** and the species is probably **'Not sensitive'** at the benchmark level **in hard rock habitats**.

Evidence on the effects of organic enrichment on *Zostera* species is limited but abundant for other seagrass species. Neverauskas (1987) investigated the effects of discharged digested sludge from a sewage treatment on *Posidonia* spp. and *Amphibolis* spp. in South Australia. Within 5 years the outfall had affected an area of approximately 1900 ha, 365 ha of which were completely denuded of seagrasses. The author suggests that the excessive growth of epiphytes on the leaves of seagrasses was a likely cause for reduced abundance. A subsequent study by Bryars & Neverauskas (2004) determined that 8 years after the cessation of sewage output, total seagrass cover was approximately 28% of its former extent. While these results suggest that seagrasses can return to a severely polluted site if the pollution source is removed, they also suggest that it will take many decades for the seagrass community to recover to its former state.

The effects of organic enrichment from fish farms were investigated on *Posidonia oceanica* seagrass beds in the Balearic Islands (Delgado *et al.*, 1999). The fish culture had ceased in 1991; however, seagrass populations were still in decline at the time of sampling. The site closest to the former fish cages showed a marked reduction in shoot density, shoot size, underground biomass, sucrose concentration and photosynthetic capacities. The shoot also had high P-concentration in tissues and higher epiphyte biomass compared to the other sites. Since water conditions had recovered completely by the time of sampling, the authors suggest that the continuous seagrass decline was due to the excess organic matter remaining in the sediment (Delgado *et al.*, 1999). It should be noted that coastal marine sediments where seagrasses grow are often anoxic and highly reduced due to the high levels of organic matter and slow diffusion of oxygen from the water column to the sediment. Seagrasses are adapted to these conditions but if the water column is organically enriched, plants are unable to maintain oxygen supply to the meristem and die fairly quickly.

Evidence shows that seagrass beds found in proximity to a source of organic discharge were severely impacted with important losses of biomass. Although no study was found on the British species, the evidence suggests that *Zostera marina* will be negatively affected by organic enrichment. No evidence was found addressing the benchmark of this study, and a deposition of 100 gC/m^2/year is considerably lower than the amount of organic matter discharged by sewage outlets and fish farms. Therefore, resistance is assessed as **'Medium'** to represent the partial loss of suitable substratum for the Stauromedusae. Recovery is probably **'Medium'** so that sensitivity is assessed as **'Medium' in seagrass beds.**

Physical Pressures

	Resistance	Resilience	Sensitivity
Physical loss (to land or freshwater habitat)	None Q: High A: High C: High	Very Low Q: High A: High C: High	High Q: High A: High C: High

All marine habitats and benthic species are considered to have a resistance of 'None' to this pressure and to be unable to recover from a permanent loss of habitat (resilience is **'Very low'**). Sensitivity within the direct spatial footprint of this pressure is, therefore **'High'**. Although no specific evidence is described, confidence in this assessment is 'High' due to the incontrovertible nature of this pressure.

Physical change (to another seabed type)	None Q: High A: High C: High	Very Low Q: High A: High C: High	High Q: High A: High C: High

The species lives attached to macroalgae and plants (seagrass) in the lower littoral and shallow subtidal. In hard rock habitats, a change in seabed type from hard rock to sediment would result in the loss the most macroalgae and, hence, the species and any early life stages. Similarly, in sedimentary habitats, a change from sediment to hard rock substratum would result in loss of seagrass beds. Based on the loss of species habitat (substratum), resistance is assessed as **'None'.** The change is defined as permanent so that resilience is assessed as **'Very low'** and sensitivity is assessed as **'High'.** Although no specific evidence is described, confidence in this assessment is 'High' due to the incontrovertible nature of this pressure.

Physical change (to another sediment type)	None Q: High A: High C: High	Very Low Q: High A: High C: High	High Q: High A: High C: High

This pressure is not **'Not relevant'** where *Haliclystus auricula* occurs on macroalgae **on hard rock habitats**. However, change in the sediment type **in seagrass beds** would result in loss of the seagrass bed and, hence, suitable substrata from *Haliclystus auricula* and, presumably, loss of early life-stages. Therefore, a resistance of **'None'** is recorded. The change is defined as permanent so that resilience is assessed as **'Very low'** and sensitivity is assessed as **'High' in seagrass beds.**

Habitat structure changes - removal of substratum (extraction)	None Q: High A: High C: High	Very Low Q: High A: High C: High	High Q: High A: High C: High

This pressure is not **'Not relevant'** where *Haliclystus auricula* occurs on macroalgae **on hard rock habitats**. However, in seagrass beds, the extraction of the sediment to 30 cm would result in the removal of *Haliclystus auricula* adults and early life-stages, its preferred substratum (seagrass and macroalgae), and the physical substratum (i.e the sediment). Therefore, a resistance of **'None'** is suggested. Recovery will depend on the time take for the sediment to return and or suitable substratum (e.g. seagrass) to return and then be recolonized by *Haliclystus auricula*. In the case of seagrass beds, recovery is likely to be slow, if at all, and resilience is probably **'Very low'** (see SS.SMp.SSgr.Zmar). Therefore, sensitivity is assessed as **'High'**, where the species occurs **in seagrass beds**.

Abrasion/disturbance of the surface of the substratum or seabed	Low Q: Low A: NR C: NR	Medium Q: Medium A: Medium C: Medium	Medium Q: Low A: Low C: Low

No evidence on the effect of abrasion (e.g. from trampling or vehicular access) of this species was found. Stauromedusae are small and soft-bodied and probably not physically robust. Similarly, their early life stages (e.g. stauropolyp, 'microhydula', encysted frustules, and overwintering planulae) are tiny and potentially susceptible to physical disturbance. However, most importantly, they are likely to be lost if their macroalgal or seagrass substratum is damaged or removed by abrasion.

Most macroalgae are very flexible but not physically robust. The trampling of shores by humans will result in increased breakage of algal thalli, decreased thallus height and a net reduction in biomass (Tyler-Walters & Arnold, 2008). The effects of trampling are dependent on intensity, expressed as frequency and force per unit area of the impacting 'footprint' (see Liddle, 1997, Tyler-Walters & Arnold, 2008). Mechanical abrasion due to vehicles, jack-up-barges, or grounding vessels will exceed the abrasive 'intensity' of trampling by humans or livestock. Overall, the abundance of fucoids and red seaweeds are likely to be reduced (see reviews of LR.MLR.MusF.MytFR, LR.MLR.BF.FvesB for detail).

Similarly, seagrass beds are thought to be sensitive to abrasion due to trampling, vehicular access, potting, boating (wakes, anchor and mooring chains) and potting (see SS.SMp.SSgr.Zmar and LS.LMp.LSgr.Znol). A reduction in the abundance of seagrass will also result in loss of substratum in this species. Seagrass is also grazed by wildfowl, who can remove a significant proportion of the shoots.

Sensitivity assessment. The sensitivity of *Haliclystus auricula* to abrasion is linked to the sensitivity of its preferred substratum; macroalgae in the intertidal and macroalgae and seagrass in the shallow subtidal. Therefore, if abrasion causes a significant reduction in the abundance of available substratum in the affected area, resistance is recorded as **'Low'**. It is difficult to know if removal of algal or plant substratum would also remove a significant proportion of the resistant or overwintering stages, although that seems likely. However, recovery is also dependent on the recovery of a suitable substratum. Therefore, a resilience of **'Medium'** (2-10 years) is suggested to account for the return of suitable substratum (which is likely to vary between 1-2 years or 2-10 years depending on species) and subsequent recovery of the resident population from the surrounding area. Hence, sensitivity is assessed as **'Medium'**.

Penetration or disturbance of the substratum subsurface	None Q: Low A: NR C: NR	Low Q: Low A: NR C: NR	High Q: Low A: Low C: Low

Hard rock is resistant of sub-surface penetration. Therefore, where this species' preferred substratum (i.e. macroalgae) occur on hard rock the pressure is recorded as **'Not relevant'.** The assessment for 'abrasion at the surface' only is, therefore, considered to equally represent sensitivity to this pressure. Please refer to ‘abrasion’ above for **hard rock habitats.**

Seagrass beds occur on sediments and are sensitive to penetrative activities that could remove the standing crop of leaves, and the rhizomes within the footprint of the activity, and hence, the substratum for this species (see LS.LMp.LSgr.Znol and SS.SMp.SSgr.Zmar). Recovery will, therefore, depend on the recovery of the seagrass bed, which is thought to be very slow and subsequent recolonization of the area by the Stauromedusae. Therefore, a resistance of **'None'** is recorded to represent the loss of the substratum (seagrass), while resilience is recorded as **'Low'** to represent to probably recovery of seagrass beds. Hence, sensitivity is assessed as **'High' in seagrass beds.**

Changes in suspended solids (water clarity)	Low Q: Low A: NR C: NR	Low Q: Low A: NR C: NR	High Q: Low A: Low C: Low

Haliclystus auricula and *Calvadosia campanulata* grow on macroalgae and seagrass. In the intertidal, they grow on macroalgae on rock, and also in pools and runnels where some sediment may accumulate (Corbin, 1979; Fenwick, 2017). But no evidence on the effects of suspended sediments on the Stauromedusae was found. However, suspended sediments may adversely affect their preferred substratum.

Increases in the cover of sediment trapping, turf-forming red algae at the expense of canopy forming species have been observed worldwide in temperate systems and have been linked to increased suspended solids linked to human activities worldwide (Airoldi, 2003). For example, canopy-forming fucoids may be replaced by more sediment tolerant species such as *Chondrus crispus*. As *Haliclystus auricula* and *Calvadosia campanulata* can grow on a variety of macroalgae an increase in suspended sediment may not be detrimental, especially as the macroalgae would probably recover within two years (i.e. 'High' resilience; for example LR.MLR.MusF.MytFR). Therefore, resistance is probably **'Medium'**, with a resilience of **'High'** and a sensitivity of **'Low'** on **hard rock shores.**

However, seagrass beds are sensitive to changes in suspended sediments and, hence, turbidity. The decline of seagrass beds globally has been linked to increased turbidity (see SS.SMp.SSgr.Zmar). Therefore, where populations of this species occur in seagrass beds, resistance is probably **'Low'** due to the loss of suitable seagrass substratum, and resilience is probably also **'Low'** due to the time taken for seagrass beds to recover. Hence, sensitivity is probably **'High**' if the population of Stauromedusae occurs **in seagrass beds.**

Smothering and siltation rate changes (light)	Low Q: Low A: NR C: NR	Medium Q: Low A: NR C: NR	Medium Q: Low A: Low C: Low

Haliclystus auricula and *Calvadosia campanulata* grow on macroalgae and seagrass. In the intertidal, they grow on macroalgae on hard rock, and also in pools and runnels where some sediment may accumulate (Fenwick, 2017). No evidence on the effects of sedimentation or smothering on the

Stauromedusae was found. However, sedimentation or smothering may adversely affect their preferred substratum.

Rocky shores. Increased abundance of algal turfs worldwide has been linked to sediment perturbations although not all the pathways and mechanisms of these effects are clear (Airoldi, 2003). However, even the most tolerant of organisms would eventually suffer from inhibition and mortality following smothering although the thresholds for these effects have has not been identified (Airoldi, 2003).In a review of the effects of sedimentation on rocky coast assemblages, Airoldi (2003) outlined the evidence for the sensitivity of coralline algae to sedimentation. The reported results are contradictory with some authors suggesting that coralline algae are negatively affected by sediments while others report that encrusting corallines are often abundant or even dominant in a variety of sediment impacted habitats (Airoldi, 2003 and references therein). Crustose corallines have been reported to survive under a turf of filamentous algae and sediment for 58 days (the duration of the experiment) in the Galapagos (species not identified, Kendrick, 1991). The crustose coralline *Hydrolithon reinboldii* has also been reported to survive deposition of silty sediments on subtidal reefs off Hawaii (Littler, 1973).

Atalah & Crowe (2010) added sediment to rockpools in controlled experiments. The rockpools were occupied by a range of algae including encrusting corallines, turfs of *Mastocarpus stellatus*, *Chondrus crispus* and *Corallina officinalis* and green and red filamentous algae. The invertebrates present were mostly *Patella ulyssiponensis*, the winkle *Littorina littorea* and the flat top shell *Gibbula umbilicalis*. Sediment treatment involved the addition of a mixture of coarse and fine sand of either 300 mg/cm^2/month or 600 mg/cm^2 every 15 days (the depth of sediment was not reported). The experimental treatments do not directly relate to the pressure benchmark but indicate some general trends in sensitivity. In the pools, the chronic addition of both levels of sediment led to a significant decrease in grazers and crustose coralline algae also decreased. Sedimentation had no significant effect on the cover of green filamentous algae (*Ulva* sp.) but led to an increase in the mean cover of red turfing algae (*Mastocarpus stellatus* and *Chondrus crispus* and *Corallina officinalis*) from 11.7% (±1.0 S.E.) in controls to 26.1% (±4.7 S.E.) in sedimented assemblages, but there were no differences between the two levels of sedimentation. The cover of red filamentous algae (*Ceramium* spp. *Gelidium* spp.) was also significantly increased in the sedimentation experiments. The experimental results support the general trend of greater sensitivity of grazers and encrusting corallines to sedimentation than turf-forming algae.

Seagrass beds. Several studies have documented deterioration of seagrass meadows by smothering due to excessive sedimentation. Consequences of enhanced sedimentation for seagrass beds depend on several factors such as the life history stage as well as the depth and timing of burial.

Early life stages of seagrass, smaller in size than adult plants, are most vulnerable to this pressure as even a small load of added sediment will lead to the complete burial. Vermaat *et al.* (1997) found that adult *Zostera marina* in the Dutch Wadden Sea was able to cope with sedimentation rates between 2 and 13 cm per year as the plant has the capacity to elongate vertical stems enabling it to raise the leaf canopy above the sediment load. A study in the USA, however, observed a mortality of over 50% of plants of *Zostera marina* in field burial treatments of 4 cm (corresponding to 25% of plant height) for 24 days (Mills & Fonseca, 2003). Plants buried 75% or more of their height (16 cm) experienced 100% mortality indicating a low resistance of *Zostera marina* to burial. The differences observed between these two studies were probably caused by different phenotypes adapted to local conditions.

Sensitivity assessment. On intertidal rocky shores exposed to wave action, 5 cm of deposited sediment is unlikely to persist for more than a few tidal cycles. However, sediment may be retained on wave sheltered shores and in sheltered rockpools. The evidence summarised above suggests that suitable substrata for *Haliclystus auricula*, *Calvadosia campanulata* and *Calvadosia cruxmelitensis* would remain in pools and on sheltered shores. However, there is no information on the resistance of the stauromedusae themselves or their early life stages, which might be damaged or suffocated by a layer of sediment. Therefore, a resistance of **'Medium'** is suggested, with a resilience of '**High'** and sensitivity is assessed as **'Low' on hard rock shores.** However, seagrass beds may be adversely affected even under a sediment layer of only 5 cm, which will be retained in the sheltered conditions. Therefore, a resistance of **'Low'** is suggested due to the potential loss of seagrass substratum, and a resilience of **'Medium'** to represent to time take for the seagrass bed to recover. Hence, sensitivity is assessed as **'Medium'** where the population occurs **in seagrass beds**.

Smothering and siltation rate changes (heavy)	None Q: Low A: NR C: NR	Very Low Q: Low A: NR C: NR	High Q: Low A: Low C: Low

As above the duration of smothering by 30 cm of deposited material is dependent on the wave exposure of the shore. In wave exposed conditions the deposit is likely to be removed within a few tidal cycles while it may remain on sheltered shores and in sheltered rock pools. The evidence summarised above suggests that suitable substrata for *Haliclystus auricula*, *Calvadosia campanulata* and *Calvadosia cruxmelitensis* would remain in pools and on sheltered shores (see evidence under 'siltation (light)' above). However, there is no information on the resistance of the stauromedusae themselves or their early life stages, which might be damaged or suffocated by a layer of sediment. Therefore, a resistance of **'Medium'** is suggested, with a resilience of '**High'** and sensitivity is assessed as **'Low' on hard rock shores.** However, seagrass beds may be adversely affected by a sediment layer of 30 cm, which will be retained in the sheltered conditions (see evidence under 'siltation (light)' above). For example, *Zostera marina* experienced 100% mortality under 16 cm of sediment. Therefore, a resistance of **'None'** is suggested due to the potential loss of seagrass substratum, and a resilience of **'Very low'** to represent to time take for the Seagrass bed to recover. Hence, sensitivity is assessed as **'High'** where the population occurs **in seagrass beds**.

Litter	Not Assessed (NA) Q: NR A: NR C: NR	Not assessed (NA) Q: NR A: NR C: NR	Not assessed (NA) Q: NR A: NR C: NR

Not assessed

Electromagnetic changes	No evidence (NEv) Q: NR A: NR C: NR	Not relevant (NR) Q: NR A: NR C: NR	No evidence (NEv) Q: NR A: NR C: NR

No evidence was found

Underwater noise changes	No evidence (NEv) Q: NR A: NR C: NR	Not relevant (NR) Q: NR A: NR C: NR	No evidence (NEv) Q: NR A: NR C: NR

No evidence was found

Introduction of light or shading	No evidence (NEv) Q: NR A: NR C: NR	Not relevant (NR) Q: NR A: NR C: NR	No evidence (NEv) Q: NR A: NR C: NR

Otto (1978) noted spawning in *Haliclystus stejnegeri* was induced by exposure to light after an 8 hour dark period, while spawning was more intense in *Haliclystus salpinx* rather than induced under the same light regime (Otto, 1978). However, this observation does not provide any evidence about the response of Stauromedusae to increased light or shading in the natural environment. No assessment was made.

Barrier to species movement	Not relevant (NR) Q: NR A: NR C: NR	Not relevant (NR) Q: NR A: NR C: NR	Not relevant (NR) Q: NR A: NR C: NR

Not relevant - this pressure is considered applicable to mobile species, e.g. fish and marine mammals rather than seabed habitats. Adult *Haliclystus auricula* are sedentary and unlikely to move far, and their early life stages are also benthic and non-motile (Clark, 1878; Miranda *et al.*, 2012). The dispersal of larval stages or propagules is not considered under the pressure definition and benchmark.

Death or injury by collision	Not relevant (NR) Q: NR A: NR C: NR	Not relevant (NR) Q: NR A: NR C: NR	Not relevant (NR) Q: NR A: NR C: NR

Not relevant' to seabed habitats. NB. Collision by interaction with bottom towed fishing gears and moorings are addressed under 'surface abrasion'.

Visual disturbance	Not relevant (NR) Q: NR A: NR C: NR	Not relevant (NR) Q: NR A: NR C: NR	Not relevant (NR) Q: NR A: NR C: NR

The Stauromedusae are sedentary and do not exhibit an escape response. Visual disturbance by passing vessels or humans at the sea surface is probably **'Not relevant.**

Biological Pressures

	Resistance	Resilience	Sensitivity
Genetic modification & translocation of indigenous species	No evidence (NEv) Q: NR A: NR C: NR	Not relevant (NR) Q: NR A: NR C: NR	No evidence (NEv) Q: NR A: NR C: NR

No evidence of the translocation, breeding or species hybridization was found.

Introduction or spread of invasive non-indigenous species	No evidence (NEv) Q: NR A: NR C: NR	Not relevant (NR) Q: NR A: NR C: NR	No evidence (NEv) Q: NR A: NR C: NR

No evidence was found to suggest a positive or negative interaction between non-indigenous invasive species and *Haliclystus auricula.*

Introduction of microbial pathogens	No evidence (NEv) Q: NR A: NR C: NR	Not relevant (NR) Q: NR A: NR C: NR	No evidence (NEv) Q: NR A: NR C: NR

No evidence of microbial or other pathogens was found.

Removal of target species	Not relevant (NR) Q: NR A: NR C: NR	Not relevant (NR) Q: NR A: NR C: NR	Not relevant (NR) Q: NR A: NR C: NR

Not relevant. This species is not subject to a targetted commercial or recreational fishery.

Removal of non-target species	Low Q: Low A: NR C: NR	Low Q: Low A: NR C: NR	High Q: Low A: Low C: Low

Removal of macroalgae or seagrass would directly affect the population of Stauromedusae by removal of its substratum. Recovery would depend on the recovery of a suitable substratum, which in the case of macroalgae could take between 1-2 or 2-10 years depending on species (for example see LR.MLR.MusF.MytFR). Hence a resistance of **'Low'** is suggested, with a resilience of **'Medium'** and a sensitivity of **'Medium' on hard rock shores**. However, incidental removal of seagrass would take longer to recover, i.e. over 10 years (see SS.SMp.SSgr.Zmar). Therefore, a resistance of **'Low'** is suggested' with a resilience of **'Low'** and a sensitivity of **'High' in seagrass beds.**

Importance review

Policy/legislation

UK Biodiversity Action Plan Priority	☑
Species of principal importance (England)	☑
Species of principal importance (Wales)	☑
Northern Ireland Priority Species	☑
Scottish Biodiversity List	☑
Features of Conservation Importance (England & Wales)	☑

Status

National (GB) importance	Not rare/scarce	**Global red list (IUCN) category**	-

Non-native

Native	Native		
Origin	-	**Date Arrived**	-

Importance information

This species was found in often high numbers (>750 in one shore search in 1973; Corbin, 1979) on shores in south-west England but is now rarely seen (Hiscock *et al.*, 2011). Hiscock *et al.* (2011) suggested that the population had declined by 90% from the 1970s to 2005, although the reason for the decline was unknown.

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