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

Corynactis viridis and a mixed turf of crisiids, *Bugula*, *Scrupocellaria*, and *Cellaria* on moderately tide-swept exposed circalittoral rock

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

Thomas Stamp

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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/habitats/detail/272]. All terms and the MarESA methodology are outlined on the website (https://www.marlin.ac.uk)

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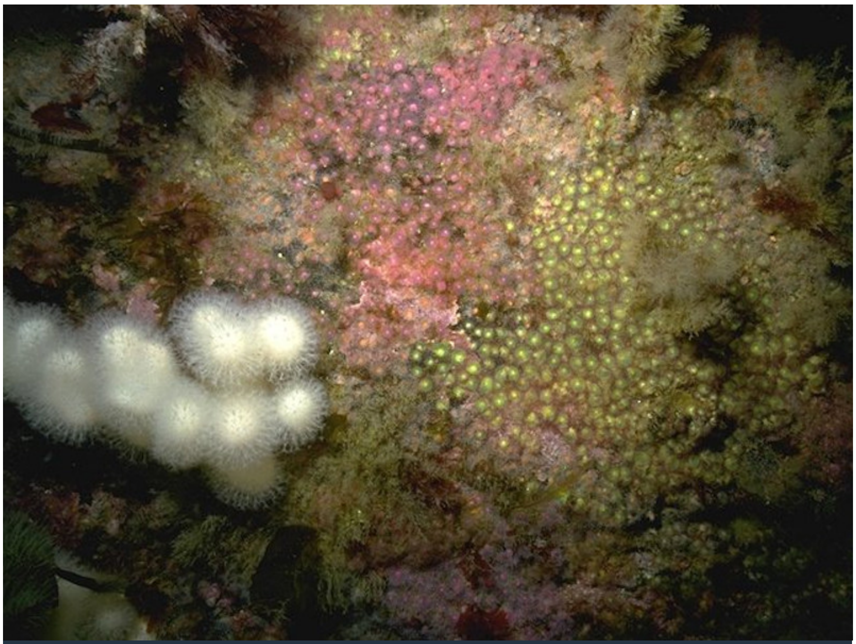
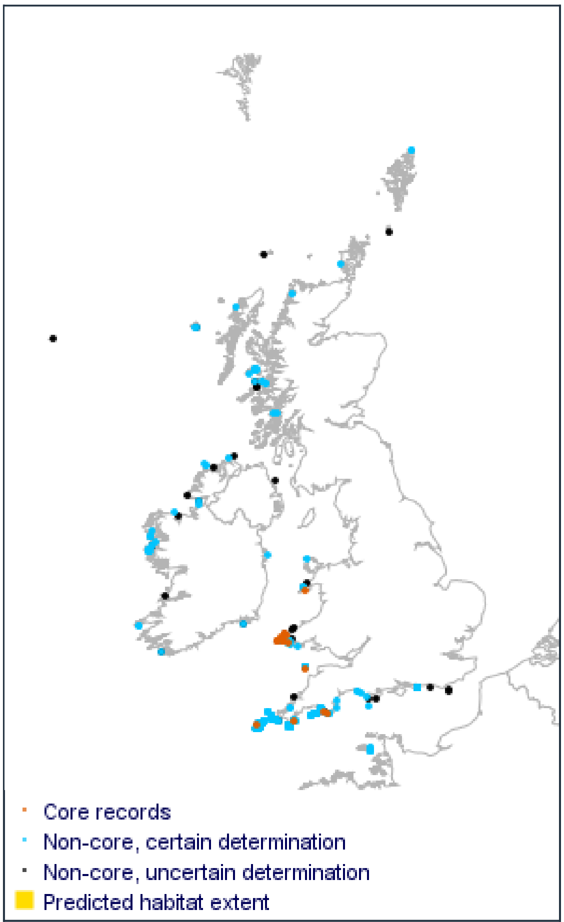


Corynactis viridis **and a mixed turf of crisiids, *Bugula, Scrupocellaria,* and *Cellaria* on moderately tide-swept exposed circalittoral rock**
Photographer: Paul Brazier



17-09-2018
Biotope distribution data provided by EMODnet Seabed Habitats (www.emodnet-seabedhabitats.eu)

Researched by Thomas Stamp **Refereed by** This information is not refereed.

Summary

UK and Ireland classification

EUNIS 2008	A4.132	*Corynactis viridis* and a mixed turf of crisiids, *Bugula*, *Scrupocellaria*, and *Cellaria* on moderately tide-swept exposed circalittoral rock
JNCC 2015	CR.HCR.XFa.CvirCri	*Corynactis viridis* and a mixed turf of crisiids, *Bugula*, *Scrupocellaria*, and *Cellaria* on moderately tide-swept exposed circalittoral rock
JNCC 2004	CR.HCR.XFa.CvirCri	*Corynactis viridis* and a mixed turf of crisiids, Bugula, Scrupocellaria, and Cellaria on moderately tide-swept exposed circalittoral rock
1997 Biotope	CR.ECR.EFa.CorCri	*Corynactis viridis* and a crisiid/*Bugula*/*Cellaria* turf on steep or vertical exposed circalittoral rock

Description

This biotope typically occurs on wave-exposed, vertical or steep, circalittoral bedrock or large boulders, usually subject to moderate or strong tidal streams. It is characterized by dense aggregations of the anemone *Corynactis viridis* and the cup coral *Caryophyllia smithii* intermixed with a short bryozoan turf of one or more *Crisia* spp., *Scrupocellaria* spp.,*Bugula* spp. and *Cellaria* spp. Occasionally, this turf obscures the underlying *Corynactis virdis* and *Caryophyllia smithii*. Cushion and encrusting sponges, particularly *Pachymatisma johnstonia*, *Cliona celata*, *Esperiopsis fucorum* and *Dysidea fragilis*, are present in moderate amounts at many sites. The axinellid sponges *Stelligera* spp. and *Raspailia* spp. are less frequently recorded. Clumps of large hydroids such as *Nemertesia antennina* and *Nemertesia ramosa* as well as the soft coral *Alcyonium digitatum* and the bryozoan *Alcyonidium diaphanum* may be found covering the hard substratum. The anemones *Actinothoe sphyrodeta* and *Sagartia elegans* are typically present in low numbers, while the hard `coral' *Pentapora foliacea* is also occasionally observed. The most frequently recorded echinoderms are *Marthasterias glacialis* and *Asterias rubens*, although other species such as *Echinus esculentus* may also be seen. The rocky substratum may have a patchy covering of encrusting red seaweeds/algae. The crabs *Necora puber* and *Cancer pagurus* may be seen in crevices or under overhangs. This biotope is regularly recorded around south west England and Wales, often on vertical rock faces. (Information from Connor *et al.*, 2004).

Depth range

10-20 m, 20-30 m

Additional information

-

Listed By

- none -

Further information sources

Search on:

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Sensitivity review

Sensitivity characteristics of the habitat and relevant characteristic species

CR.HCR.XFa.CvirCri occurs on wave-exposed, vertical or steep, circalittoral bedrock or large boulders, usually subject to moderate or strong tidal streams. It is characterized by dense aggregations of the anemone *Corynactis viridis* and the cup coral *Caryophyllia smithii* intermixed with a short bryozoan turf of one or more *Crisia spp*., *Scrupocellaria spp*., *Bugula spp.* and *Cellaria spp.* Cushion and encrusting sponges, particularly *Pachymatisma johnstonia*, *Cliona celata*, *Esperiopsis fucorum* and *Dysidea fragilis*, are present in moderate amounts at many sites (Connor *et al*., 2004). For this sensitivity assessment, *Corynactis viridis*, *Caryophyllia smithii*, and the bryozoan turf species; *Crisia spp*., *Scrupocellaria spp*., *Bugula spp.* and *Cellaria spp.* are the primary foci of research. Cushion and encrusting sponges, particularly *Pachymatisma johnstonia*, *Cliona celata*, *Esperiopsis fucorum* and *Dysidea fragilis* as well as *Alcyonium digitatum* are also mentioned throughout, however, the sensitivity assessments within this review are largely based on the *Corynactis viridis*, *Caryophyllia smithii* and bryozoans within this biotope.

Resilience and recovery rates of habitat

Corynactis viridis is a small anemone, with a base up to 10 mm in diameter and up to 15 mm in height (Ager, 2007), which grows on sublittoral rock walls and shaded parts of ship wrecks (Wood, 2007). *Corynactis viridis* is distributed from the North Shetland, UK (Ager, 2007) to the Iberian peninsula (Ramos, 2010) and Greece (Koukouras, 2010). Little is known on sexual reproduction or recruitment within this species. Hiscock *et al.* (2010) observed *Corynactis viridis* recruited onto the wreck of the Scylla within a year of the vessel sinking (see below). *Corynactis viridis* can reproduce via a-sexual budding, which can cause dense aggregations of uni-coloured clones.

Caryophyllia smithii is a small (max 3 cm across) solitary coral common within tide swept sites of the UK (Wood, 2005), distributed from Greece (Koukouras, 2010) to the Shetland Islands and southern Norway (NBN, 2015). It was suggested by Fowler & Laffoley (1993) that *Caryophyllia smithii* was a slow growing species (0.5-1 mm in horizontal dimension of the corallum per year), which in turn suggests that inter-specific spatial competition with colonial faunal or algae species are important factors in determining local abundance of *Caryophyllia smithii* (Bell & Turner, 2000). *Caryophyllia smithii* reproduces sexually; sessile polyps discharge gametes typically from January-April, gamete release is most likely triggered by seasonal temperature increases, gametes are fertilized in the water column and develop into a swimming planula, which then settles onto the suitable substrata. The pelagic stage of the larvae may last up to 10 weeks, which provides this species with a good dispersal capability (Tranter *et al*., 1982).

Crisia spp., *Scrupocellaria spp*., *Bugula spp.* and *Cellaria spp*. are erect active suspension feeding bryozoans which grow erect pinnate colonies to a maximum of 3-6 cm height from the seabed. Within the bryozoan genera described above there are many species distributed across the British Isles, however within the biotope description no particular species is mentioned, and therefore the evidence presented within this review covers all species within the mentioned genera. No evidence was found that *Crisia spp*., *Scrupocellaria spp.* records from the North East Atlantic occurred further north than Shetland, UK. *Bugula spp.* have however been recorded up to Trondheim, Norway (Christie *et al*., 2003). *Crisia spp.* have a wide distribution within the Atlantic, for example; *Crisia denticulata*, *Crisia elongata*, *Crisia ramosa* are recorded to as far south as the Gulf of Mexico. *Scrupocellaria spp.* southern limit in the North East Atlantic is the Iberian peninsula (Ramos, 2010). *Bugula neritina* is recorded from the Arabian sea (Molnar *et al*., 2008) *Bugulina* *turbinata* (syn. *Bugula turbinata*) and *Crisularia plumosa* (syn. *Bugula plumosa*) is recorded to the iberian peninsula (Ramos, 2010).

Bugula spp. and other bryozoan species exhibit multiple generations per year (see below), that involve good local recruitment, rapid growth and reproduction. Bryozoans are often opportunistic, fouling species that colonize and occupy space rapidly. For example, hydroids would probably colonize with 1-3 months and return to their original cover rapidly; while *Bugula* species have been reported to colonize new habitats within 6 -12 months. However, *Bugula* has been noted to be absent form available habitat even when large populations are nearby (Castric-Frey, 1974; Keough & Chernoff, 1987), suggesting that recruitment may be more sporadic (Tyler-Walters, 2002).

Where the population is reduced in extent or abundance but individuals remain, local recruitment, augmented by dormant resistant stages and asexual reproduction, is likely to result in rapid recovery of the dominant bryozoan species, probably within 12 months. The brooded, lecithotrophic coronate larvae of many bryozoans (e.g. *Flustra foliacea*, *Securiflustra securifrons*, and *Bugula* species), have a short pelagic lifetime of several hours to about 12 hours (Ryland, 1976). Recruitment is dependent on the supply of suitable, stable, hard substrata (Eggleston, 1972b; Ryland, 1976; Dyrynda, 1994). However, even in the presence of available substratum Ryland (1976) noted that significant recruitment in bryozoans only occurred in the proximity of breeding colonies. For example, Hatcher (1998) reported colonization of slabs, suspended 1 m above the sediment, by *Bugulina fulva* (syn. *Bugula fulva*) within 363 days while Castric-Fey (1974) noted that *Bugulina turbinata*, *Crisularia plumosa* and *Bugulina calathus* (syn. *Bugula calathus*) did not recruit to settlement plates after ca two years in the subtidal even though present on the surrounding bedrock. Similarly, Keough & Chernoff (1987) noted that *Bugula neritina* was absent from areas of seagrass bed in Florida even though substantial populations were present <100m away.

Alcyonium digitatum is a colonial species of soft coral with a wide distribution in the North Atlantic, recorded from Portugal (41°N) to Northern Norway (70°N) as well as on the east coast of North America (Hartnoll, 1975; Budd, 2008). Colonies consist of stout "finger like" projections (Hartnoll, 1975) which can reach up to 20 cm tall (Budd, 2008) and can dominate circalittoral rock habitats (as in CR.HCR.FaT.CTub.Adig; Connor *et al.*, 2004). *Alcyonium digitatum* colonies are likely to have a lifespan which exceeds 20 years as colonies have been followed for 28 years in marked plots (Lundälv, pers. comm., in Hartnoll, 1998). Those colonies which are 10-15 cm in height have been aged at between 5 and 10 years old (Hartnoll, unpublished). Most colonies are unisexual, with the majority of individuals being female. Sexual maturity is predicted to occur, at it's earliest, when the colony reaches it's second year of growth, however the majority of colonies are not predicted to reach maturity until their third year (Hartnoll, 1975). As documented within Whomersley & Picken (2003) and Hiscock *et al.* (2010) (see below), *Alcyonium digitatum* can recruit within 1-2 years, however may require a further 5 years to become fully established.

Cliona celata is considered a hardy sponge, tolerant of environmental stressors such as high nutrient loads, low salinity, and large temperature variation (Duckworth & Peters, 2013). *Cliona celata* is a physically distinctive species of sponge that can bore into soft rock (e.g. limestone) or in hard rock areas has a massive form (Wood, 2007). The boring form is recognizable as yellow papillae sticking out of limestone (calcareous rock, mollusc shells). The massive form has raised, rounded ridges up to 40 cm across. Large oscules with raised rims are found along the tops of the ridges. It often forms a thick plate-like structure standing on its edge with large specimens growing up to 1 m across and 50 cm high (Snowden, 2007). According to the World Porifera database, *Cliona celata* has a relatively cosmopolitan distribution from north of Shetland to the cape of good hope, South Africa, as well as being recorded throughout the Mediterranean (Van Soest, 2016). No specific information for *Cliona celata* longevity was found, however, in general, sponges have a relatively long lifespan, e.g. Ayling (1983) estimated sponge patches in New Zealand were over 70 years old. Piscitelli *et al.* (2011) observed an annual peak in reproductive activity in April-May from individuals in the Mediterranean, and suggested this was a result of a sharp seasonal increase in water temperature. However, Carver *et al.* (2010) suggested *Cliona celata* specimens from New Brunswick, Canada spawned from June-July. Recruitment can occur via larval settlement as well as through transfer or contact, i.e. sponge colonies can spread to new or virgin substrata if they come in contact with existing colonies (Duckworth & Peterson, 2013). Warburton (1966) documented the spawning of *Cliona celata* under laboratory conditions, and reported the production of motile larvae that settled after 2 days (Carver *et al.*, 2010). Information concerning colonization rates are scare however, tropical clionid sponges (the same taxonomic family as *Cliona celata*) can colonize dead coral within “a few weeks” and live coral within 2-3 months (Schönberg & Wilkinson, 2001). Furthermore, the short larval period (2 days) plus observation from Carver *et al.* (2010) indicate *Cliona celata* can colonize virgin surfaces within a year. *Cliona celata* is a pest species in scallop aquaculture. Carver *et al.* (2010) demonstrated that contact between shells colonized with *Cliona celata* and those that were not colonized results in rapid spread in *Cliona celata* throughout scallop farms. Once settled, *Cliona celata* colonies have a rapid growth rate of up to 15 cm^2/yr (Carver *et al.*, 2010).

Whomersley & Picken (2003) documented epifauna colonization of offshore oil platforms in the North Sea from 1989-2000. On all platforms *Mytilus edulis* dominated the near surface community. For the first 3 years, hydroids and tubeworms dominated the community below the mussel band. However the hydroid community were later out-competed by other more climax communities. Recruitment of *Alcyonium digitatum* and *Metridium senile* began at 2-5 years (dependent on the oil rig). The community structure and zonation differed between the four rigs, however, after four years *Metrdium senile* had become the dominant organism below the mussel zone to approximately 60-80 m Below Sea Level (BSL). Zonation differed between oil rigs, however, from approximately 60-90 m BSL *Alcyonium digitatum* was the dominant organism.

The *Scylla* was intentionally sunk on the 27th March 2004 in Whitsand Bay, Cornwall to act as an artificial reef. Hiscock *et al.* (2010) recorded the succession of the biological community on the wreck for five years following the sinking of the ship. Initially the wreck was colonized by opportunistic species /taxa; filamentous algae, hydroids, serpulid worms and barnacles. *Tubularia* sp. were early colonizers, appearing within a couple of months after the vessel was sunk. *Metridium senile* appeared late in the summer of the first year, but didn’t become visually dominant until 2007 (three years after the vessel was sunk). *Sagartia elegens* was recorded within the summer of 2005, and by the end of 2006 was well established. *Corynactis viridis* was first recorded in the summer of the first year and quickly formed colonies via asexual reproduction. *Urticina felina* was first recorded at the end of August 2006 (2 years after the vessel was sunk), and by summer 2008 had increased in abundance. *Alcyonium digitatum* was first recorded in early summer 2005, a year after the vessel was sunk. Within one year of growth colonies had grown to nearly full size, however, did not become a visually dominant component of the community until 2009 (five years after the vessel had been sunk). The authors noted that erect branching Bryozoa (such as *Securiflustra securifrons*) are not a common part of rocky reef communities to the west of Plymouth and had not colonized to any great extent on *Scylla* by the end of the study, although several species were recorded, which included *Chartella papyracea* in 28/08/2006 (two years after the vessel was sunk). *Caryophyllia smithii* was noted to colinize the wreck a year after the vessel was sunk.

Jensen *et al.* (1994) reported the colonization of an artificial reef in Poole Bay, England. They noted that erect bryozoans, including *Bugulina plumosa*, began to appear within six months, reaching a peak in the following summer, 12 months after the reef was constructed. Similarly, ascidians colonized within a few months e.g. *Aplidium spp.* Sponges were slow to establish with only a few species present within 6-12 months but beginning to increase in number after two years, while anemones were very slow to colonize with only isolated specimens present after 2 years (Jensen *et al.*, 1994.). In addition, Hatcher (1998) reported a diverse mobile epifauna after a years' deployment of her settlement panels.

Resilience assessment. Overall, bryozoans are opportunistic, grow and colonize space rapidly and will probably develop a faunal turf within 1-2 years. Similarly, as reported by Hiscock *et al.* (2010), both *Corynactis viridis* and *Caryophyllia smithii* can colonize virgin surfaces within a year but the community may take another year to become established. Therefore, resilience has been assessed as '**High**'.

Hydrological Pressures

	Resistance	Resilience	Sensitivity
Temperature increase (local)	Low Q: Low A: NR C: NR	High Q: High A: High C: High	Low Q: Low A: Low C: Low

Corynactis viridis is distributed from the North Shetland, UK (Ager, 2007) to the Iberian peninsula (Ramos, 2010) and Greece (Koukouras, 2010). Mature examples of *Caryophyllia smithii* are recorded in Greece (Koukouras, 2010), and are therefore unlikely to be physically affected at the benchmark. However, Tranter *et al.* (1982) suggested *Caryophyllia smithii* reproduction was cued by seasonal increases in seawater temperature. Therefore, unseasonal increases in temperature may disrupt natural reproductive processes and negatively influence recruitment patterns. Some *Crisia* and *Bugula* species have been recorded from the gulf of Mexico and Arabian sea (respectively), where sea surface temperature far exceeds that experienced within the British Isles. However, *Scrupocellaria* and a number of *Bugula spp.* have a southern limit at the Iberian Peninsula (Ramos, 2010) (in their North East Atlantic distribution), where average annual temperature is approximately 2-4°C higher (Temp taken from San Sebastian, Beszczynska-Möller & Dye, 2013) than in the south west of the UK (temp taken from Plymouth, Beszczynska-Möller & Dye, 2013). Menon (1972) demonstrated that encrusting bryozoan species (*Membranipora membranacea*, *Electra pilosa* and *Conopeum reticulum*) were capable of acclimating to acute temperature increases of up to 5°C before significant mortality occurred. No similar information was available for the specific bryozoan genera assessed within this review, however, all three species can be found in the sub littoral and therefore could indicate heat acclimation response within *Bryozoa*.

CR.HCR.XFa.CvirCri is distributed from the Cornwall, west coast of Wales and potentially North West Ireland. Sea surface temperature across this distribution ranges 8-16°C in summer and 6-13°C in winter (Beszczynska-Möller & Dye, 2013).

Sensitivity assessment. All the characterizing species within CR.HCR.XFa.CvirCri are recorded from the Iberian peninsula and are therefore unlikely to be affected by a 2°C for one year. Bryozoa have been shown to acclimate to 5°C temperature increases before significant mortality occurs. Acute temperature increases may, however, negatively affect anthozoan reproduction and hence recruitment. Resistance has been assessed as '**Medium**', resilience has been assessed as '**High**'. Sensitivity has been assessed as '**Low'.**

Temperature decrease (local)	Low Q: Low A: NR C: NR	High Q: High A: High C: High	Low Q: Low A: Low C: Low

Corynactis viridis is distributed from the North Shetland, UK (Ager, 2007) to the Iberian peninsula (Ramos, 2010) and Greece (Koukouras, 2010). *Caryophyllia smithii* has a northern range limit in the Shetland isles and southern Norway (NBN, 2015). The bryozoan taxa within CR.HCR.XFa.CvirCri have their northern range limit (North East Atlantic) within north Scotland and/or mid-Norway. CR.HCR.XFa.CvirCri is distributed from Cornwall, the west coast of Wales and potentially north-west Ireland. Sea surface temperature across this distribution ranges 8-16°C in summer and 6-13°C in winter (Beszczynska-Möller & Dye, 2013).

Sensitivity assessment. All the characterizing species within CR.HCR.XFa.CvirCri may be limited by cold temperatures within the UK, and may explain the south westerly distribution of this CR.HCR.XFa.CvirCri. Resistance has been assessed as '**Low**', resilience as '**High**'. Sensitivity has been assessed as '**Low**'.

Salinity increase (local)	Low Q: Low A: NR C: NR	High Q: High A: High C: High	Low Q: Low A: Low C: Low

Corynactis viridis and *Caryophyllia smithii* are recorded in the Mediterranean. Some *Crisia* and *Bugula* species have been recorded from the gulf of Mexico and Arabian sea (respectively). Therefore, some of the characterizing species are likely to tolerate 39-40 psu. However, a significant increase in salinity beyond this range may cause declines in abundance.

Sensitivity assessment. Resistance has been assessed as '**Low**', resilience as '**High**'. Sensitivity has been assessed as '**Low**'.

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

In general, there is a scarcity of *Corynactis viridis* or *Caryophyllia smithii* records as important characterizing species from reduced salinity biotopes (Connor *et al*., 2004) indicating that these species require full salinity (30-40‰) to dominate the substrata.

Ryland (1970) stated that, with a few exceptions, the Gymnolaemata bryozoans (the taxonomic class that *Bugula spp.* are a part of) were fairly stenohaline and restricted to full salinity (ca 35 psu) and noted that reduced salinities result in an impoverished bryozoan fauna. Soule & Soule (1979) suggested that some species of *Bugula* may be considered euryhaline, e.g. *Bugula neritina* and *Bugulina californica* occur in harbours subject to large freshwater runoff. Lynch (cited in Hyman, 1959) reported that reduced salinity delayed metamorphosis in larvae of *Bugula neritina* but not in *Bugulina flabellata* or *Crisularia turrita (syn. Bugula turrita)*. *Bugulina turbinata* populations in the intertidal are likely to be exposed to freshwater runoff and rainfall.

Sensitivity review. CR.HCR.XFa.CvirCri is restricted to full marine conditions (30-40 ‰) (Connor *et al*., 2004). The lack of records within "Reduced" salinity (18-30‰) suggests the community would not persist/be recognisable if salinity was reduced. Resistance has been assessed as '**Low**', resilience as '**High**' and sensitivity as '**Low**'.

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

The biological community within CR.HCR.XFa.CvirCri is dominated by suspension feeders that rely on water currents to supply food. These taxa are therefore likely to thrive in conditions of vigorous water flow. *Corynactis viridis* or *Caryophyllia smithii*, in particular, are described as favouring sites with high water flow or surge currents (Bell & Turner, 2000; Wood, 2005).

Water flow has been shown to be important for the development of bryozoan communities and the provision of suitable hard substrata for colonization (Eggleston, 1972b; Ryland, 1976). In addition, areas subject to the high mass transport of water such as the Menai Strait, Wales, or tidal rapids generally support large numbers of bryozoan species. Okamura (1984) reported that an increase in water flow from slow flow (0.01-0.02 m/s) to fast flow (0.1-0.12 m/s) reduced feeding efficiency in small colonies but not in large colonies of *Bugulina stolonifera*. *Bugulina turbinata* has also been recorded from strong to weak tidal streams (0.5-3 m/sec) (Tyler-Walters, 2005c).

Sensitivity assessment. CR.HCR.XFa.CvirCri is recorded from moderately strong-strong tidal streams (0.5-3m/sec) (Connor *et al*., 2004), furthermore, all the characterizing species are reliant on high water flow for food supply. A change in tidal velocity of 0.1-0.2 m/s is not likely to have a significant effect on the biotope. Resistance has been assessed as '**High**', resilience has been assessed as '**High**'. Sensitivity has been assessed as '**Not sensitive**'.

Emergence regime changes	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

Changes in emergence are **not relevant** to CR.HCR.XFa.CvirCri which is restricted to fully subtidal/circalittoral conditions. The pressure benchmark is relevant only to littoral and shallow sublittoral fringe biotopes.

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

CR.HCR.XFa.CvirCri is recorded from very exposed – moderately wave exposed sites (Connor *et al*., 2004). *Caryophyllia smithi*, *Corynactis viridis* and bryozoans are suspension feeders relying on water currents to supply food. These taxa, therefore, thrive in conditions of vigorous water flow.

Caryophyllia smithi and *Corynactis viridis* are small anemones (see resilience section) who are unlikely to exceed >3 cm height from the seabed. The small size of these anemones is, therefore, likely to reduce friction caused by the surrounding water flow, and reduce the risk of these species from being removed from rock surfaces.

Bugula spp. produce flexible erect tufts, which are likely to move with the oscillatory flow created by wave action. *Bugula*, *Bugulina* and Crisiidae have all been recorded from very wave exposed biotopes (Connor *et al*., 2004; Tyler-Walters, 2005c).

Sensitivity assessment. Wave action is a fundamental environmental variable controlling the biological community of sub-littoral biotopes. A large and significant change in wave height may fundamentally alter the character of CR.HCR.XFa.CvirCri. However, a change in near shore significant wave height of 3-5% is not likely to have a significant effect on the biological community. Resistance has been assessed as '**High**', resilience has been assessed as '**High**'. Sensitivity has been assessed as '**Not sensitive**'.

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** but evidence is presented where available.

No information was found relating to the sensitivity of *Caryophyllia smithii* or *Corynactis viridis* to heavy metal contamination. Bryozoans are common members of the fouling community and amongst those organisms most resistant to antifouling measures, such as copper-containing anti-fouling paints (Soule & Soule, 1979; Holt et al., 1995). Most of the information found concerning the toxicity of metals to this genus concerned *Bugula neritina*. Lee & Trot (1973) reported that *Bugula neritina* colonized wooden panels treated with copper based antifouling paints and dominated the succession after 5-7 weeks. *Bugula neritina* was reported to survive but not grow exposed to ionic Cu concentrations of 0.2-0.3 ppm, while larvae died above 0.3ppm (Soule & Soule, 1979). Similarly, Ryland (1967) reported that *Bugula neritina* died where the surface leaching rate of Cu exceeded 10 µg Cu/cm▯/day, while ancestrulae may recover from prolonged Cu exposure if transferred to clean seawater. Ryland (1967) also noted that *Bugula neritina* was less intolerant of Hg than Cu. Copper ion concentrations greater than 2.5 mg $CuCl_2$/l stimulated a change from positive to negative phototactic response in *Bugulina simplex* (Ryland, 1967).

	Resistance	Resilience	Sensitivity
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** but evidence is presented where available.

CR.HCR.XFa.CvirCri is a sub-tidal biotope (Connor *et al.*, 2004). Oil pollution is mainly a surface phenomenon its impact upon circalittoral turf communities is likely to be limited. However, as in the case of the *Prestige* oil spill off the coast of France, high swell and winds can cause oil pollutants to mix with the seawater and potentially negatively affect sublittoral habitats (Castège *et al.*, 2014). Smith (1968) reported dead colonies of *Alcyonium digitatum* at a depth of 16 m in the locality of Sennen Cove, Cornwall which was likely a result of toxic detergents sprayed along the shoreline to disperse oil from the *Torrey Canyon* tanker spill (Budd, 2008). No information was found relating to the sensitivity of *Caryophyllia smithii* or *Corynactis viridis* to hydrocarbon contamination.

Soule & Soule (1979) reported that *Bugula neritina* was lost from breakwater rocks in the vicinity of the December 1976 Bunker C oil spill in Los Angeles Harbour, and had not recovered within a year. However, it had returned to a nearby area within 5 months even though the area was still affected by sheens of oil. Similarly, Mohammad (1974) reported that *Bugula spp.* and *Membranipora spp.* were excluded from settlement panels near a Kuwait oil terminal subject to minor but frequent oil spills.

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** but evidence is presented where available.

No information was found relating to the sensitivity of *Caryophyllia smithii* or *Corynactis viridis* to synthetic compound contamination. Bryozoans are common members of the fouling community and amongst those organisms most resistant to antifouling measures, such as copper-containing anti-fouling paints (Soule & Soule, 1979; Holt *et al.*, 1995). Bryan & Gibbs (1991) reported that there was little evidence regarding TBT toxicity in Bryozoa with the exception of the encrusting *Schizoporella errata*, which suffered 50% mortality when exposed for 63 days to 100 ng/l TBT. Rees *et al.* (2001) reported that the abundance of epifauna (including bryozoans) had increased in the Crouch estuary in the five years since TBT was banned from use on small vessels. This last report suggests that bryozoans may be at least inhibited by the presence of TBT. Moran & Grant (1993) reported that settlement of marine fouling species, including *Bugula neritina*, was significantly reduced in Port Kembla Harbour, Australia, exposed to high levels of cyanide, ammonia and phenolics. Note, however, that *Bugula neritina* is a warm temperate species probably only remotely related to the NE Atlantic species (P. Hayward, pers. comm.). Hoare & Hiscock (1974) suggested that polyzoa were amongst the most sensitive species to acidified halogenated effluents in Amlwch Bay, Anglesey and noted that *Bugulina flabellata* did not occur within the bay.

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	Low Q: Low A: NR C: NR	High Q: Low A: NR C: NR	Low Q: Low A: Low C: Low

In general, respiration in most marine invertebrates do not appear to be significantly affected until extremely low concentrations are reached. For many benthic invertebrates, this concentration is about 2 ml/l, or even less (Herreid, 1980; Rosenberg *et al.*, 1991; Diaz & Rosenberg, 1995). No information was found relating to the sensitivity of *Corynactis viridis* to de-oxygenation. There is anecdotal evidence to suggest that *Alcyonium digitatum, Caryophyllia smithii* hypoxic events.

Alcyonium digitatum mainly inhabits environments in which the oxygen concentration usually exceeds 5 ml/l and respiration is aerobic (Budd, 2008). In August 1978 a dense bloom of a dinoflagellate, *Gyrodinium aureolum* occurred surrounding Geer reef in Penzance Bay, Cornwall and persisted until September that year. Observations by local divers indicated a decrease in underwater visibility (<1 m) from below 8 m Below Sea Level. It was also noted that many of the faunal species appeared to be affected, e.g. no live *Echinus esculentus* were observed whereas on surveys prior to August were abundant. *Alcyonium sp.* and Bryozoans were also in an impoverished state. *Caryophyllia smithii* were also in a contracted state, apparently dead, and with *Echinus* *esculentus* were the worst affected species during the bloom. During follow-up surveys conducted in early September *Alcyonium sp.* were noted to be much healthier and feeding. It was suggested the decay of *Gyrodinium aureolum* either reduced oxygen levels or physically clogged faunal feeding mechanisms. Adjacent reefs were also surveyed during the same time period and the effects of the *Gyrodinium aureolum* bloom were less apparent. It was suggested that higher water agitation in shallow water on reefs more exposed to wave action were less affected by the phytoplankton bloom (Griffiths *et al.*, 1979).

CR.HCR.XFa.CvirCri is recorded from moderately strong-strong tidal streams (0.5-3m/sec) and at very wave exposed to moderately wave exposed sites (Connor *et al.*, 2004). Therefore, high water movement (through wave action and/or tidal flow) could potentially cause mixing with surrounding oxygenated water (Griffiths *et al.*, 1979) and may, therefore, decrease the effects of de-oxygenation rapidly.

Sensitivity assessment. Resistance has been assessed as '**Low**', Resilience as '**High**'. Sensitivity as '**Low**'.

Nutrient enrichment	Not relevant (NR) Q: NR A: NR C: NR	Not relevant (NR) Q: NR A: NR C: NR	Not sensitive Q: NR A: NR C: NR

This biotope is considered to be **'Not sensitive'** at the pressure benchmark that assumes compliance with good status as defined by the WFD.

All the characterizing species within CR.HCR.XFa.CvirCri are suspension feeders. Nutrient enrichment of coastal waters that enhances the population of phytoplankton may be beneficial in terms of an increased food supply but the effects are uncertain (Hartnoll, 1998). High primary productivity in the water column combined with high summer temperature and the development of thermal stratification (which prevents mixing of the water column) can lead to hypoxia of the bottom waters which faunal species are likely to be highly intolerant of (see de-oxygenation pressure).

Johnston & Roberts (2009) conducted a meta-analysis, which reviewed 216 papers to assess how a variety of contaminants (including sewage and nutrient loading) affected 6 marine habitats (including subtidal reefs). A 30-50% reduction in species diversity and richness was identified from all habitats exposed to the contaminant types.

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

All the characterizing species within CR.HCR.XFa.CvirCri are suspension feeders. Organic enrichment of coastal waters that enhances the population of phytoplankton may be beneficial to *Caryophyllia smithii*, *Corynactis viridis* and the bryozoan turf species in terms of an increased food supply but the effects are uncertain (Hartnoll, 1998). The survival of *Caryophyllia smithii*, *Corynactis viridis* and the bryozoan turf species may be influenced indirectly. High primary productivity in the water column combined with high summer temperature and the development of thermal stratification (which prevents mixing of the water column) can lead to hypoxia of the bottom waters which faunal species are likely to be highly intolerant of (see de-oxygenation pressure).

Bugulina stolonifera was reported to occur in areas of the Port of Genoa harbour, heavily affected by domestic sewage pollution (Soule & Soule, 1979). Other bryozoan species within the same genus may be affected similarly.

Johnston & Roberts (2009) conducted a meta-analysis, which reviewed 216 papers to assess how a variety of contaminants (including sewage and nutrient loading) affected 6 marine habitats (including subtidal reefs). A 30-50% reduction in species diversity and richness was identified from all habitats exposed to the contaminant types.

Sensitivity assessment. Organic enrichment is not likely to directly negatively affect the characterizing species within this biotope, however, chronic organic enrichment may cause secondary effects such as hypoxia (refer to de-oxygenation pressure). Resistance has been assessed as '**Low**', Resilience as '**High**'. Sensitivity as '**Low**'.

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

If rock were replaced with sediment, this would represent a fundamental change to the physical character of the biotope and the species would be unlikely to recover. The biotope would be lost.

Sensitivity assessment. Resistance to the pressure is considered '**None**', and resilience '**Very low**'. Sensitivity has been assessed as '**High**'.

Physical change (to another sediment type)	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

Habitat structure changes - removal of substratum (extraction)	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 species characterizing this biotope are epifauna or epiflora occurring on rock and would be sensitive to the removal of the habitat. However, extraction of rock substratum is considered unlikely and this pressure is considered to be '**Not relevant**' to hard substratum habitats.

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

CR.HCR.XFa.CvirCri is a subtidal biotope (Connor *et al.*, 2004). Therefore abrasion is most likely to be a result of bottom or pot fishing gear, cable laying etc. which may cause localised mobility of the substrata and mortality of the resident community. The effect would be situation dependent however if bottom fishing gear were towed over a site it may mobilise a high proportion of the rock substrata and cause high mortality in the resident community.

No relevant case studies were found on which to assess this pressure, however, *Caryophyllia smithii*, *Corynactis viridis* and bryozoans are sedentary species that might be expected to suffer from the effects of dredging. Boulcott & Howell (2011) conducted experimental Newhaven scallop dredging over a circalittoral rock habitat in the sound of Jura, Scotland and recorded the damage to the resident community. The results indicated that the sponge *Pachymatisma johnstoni* was highly damaged by the experimental trawl. However, only 13% of photographic samples showed visible damage to *Alcyonium digitatum*. Where *Alcyonium digitatum* damage was evident it tended to be small colonies that were ripped off the rock. The authors highlight physical damage to faunal turfs (erect bryozoans and hydroids) was difficult to quantify in the study. However, the faunal turf communities did not show large signs of damage and were only damaged by the scallop dredge teeth which was often limited in extent (approximately 2 cm wide tracts). The authors indicated that species such as *Alcyonium digitatum* and faunal turf communities were not as vulnerable to damage through trawling as sedimentary fauna and whilst damage to circalittoral rock fauna did occur it was of an incremental nature, with the loss of species such as *Alcyonium digitatum* and faunal turf communities increasing with repeated trawls. Please note, Boulcott & Howell (2011) did not mention the abrasion caused by fully loaded collection bags on the new haven dredges. A fully loaded Newhaven dredge may cause higher damage to the community than indicated in their study.

Sensitivity assessment. Resistance has been assessed as '**Medium**', resilience as '**High**' and sensitivity as '**Low**'.

Penetration or disturbance of the substratum subsurface	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 species characterizing this biotope group are epifauna or epiflora occurring on rock which is resistant to subsurface penetration. The assessment for abrasion at the surface only is therefore considered to equally represent sensitivity to this pressure. This pressure is '**Not relevant**' to hard rock biotopes.

Changes in suspended solids (water clarity)	High Q: High A: High C: High	High Q: High A: High C: High	Not sensitive Q: High A: High C: High

Caryophyllia smithi, *Corynactis viridisi and* bryozoans are not thought highly susceptible to changes in water clarity due to the fact they are suspension feeding organisms and are not directly dependent on sunlight for nutrition. Suspension feeding organisms may be adversely affected by increases in suspended sediment, due to clogging of their feeding apparatus. Bryozoan turfs form preferentially on steep surfaces and under overhangs and larvae preferentially settle under overhangs, presumably to avoid smothering and siltation (Ryland, 1977; Hartnoll, 1983). Wendt (1998) noted that *Bugula neritina* grew faster on downward facing surfaces than upward facing surfaces, presumably due to siltation and reduced feeding efficiency on upward facing surfaces. But where water flow is sufficient to prevent siltation, *Bugulina turbinata* may colonize upward facing surfaces (Hiscock & Mitchell, 1980). *Alcyonium digitatum* has been shown to be tolerant of high levels of suspended sediment. Hill *et al.* (1997) demonstrated that *Alcyonium digitatum* sloughed off settled particles with a large amount of mucous. *Alcyonium digitatum* is also known to inhabit the entrances to sea lochs (Budd, 2008) or the entrances to estuaries (Braber & Borghouts, 1977) where water clarity is likely to be highly variable. Increased turbidity will reduce light penetration and hence phytoplankton productivity. Small phytoplankton are probably an important food source in the shallow subtidal, although, *Flustra foliacea* is also found at greater depths, where organic particulates (detritus) are probably more important.

Sensitivity assessment. Resistance has been assessed as '**High**', resilience as '**High**' and sensitivity as '**Not Sensitive**' at the benchmark level.

Smothering and siltation rate changes (light)	High Q: Low A: NR C: NR	High Q: High A: High C: High	Not sensitive Q: Low A: Low C: Low

Caryophyllia smithii, *Corynactis viridis* and bryozoans are sessile and thus would be unable to avoid the deposition of a smothering layer of sediment. Some *Alcyonium digitatum* colonies can attain a height of up to 20 cm (Edwards, 2008), so would still be able to feed in the event of sediment deposition. *Caryophyllia smithii*, *Corynactis viridis* and the bryozoan turf within CR.HCR.XFa.CvirCri are small (approx. <5 cm height from the seabed) and would therefore likely be inundated in a "light" sedimentation event. However, Bell & Turner (2000) reported *Caryophyllia smithii* was abundant at sites of "moderate" sedimentation (7 mm ± 0.5 mm) in Lough Hyne. It is, therefore, likely that *Caryophyllia smithii* would be resistant to periodic sedimentation. CR.HCR.XFa.CvirCri is recorded from moderately strong-strong tidal streams (0.5-3 m/sec) and at very wave exposed to moderately wave exposed sites (Connor *et al.*, 2004). Therefore, water movement (through wave action and/or tidal flow) would be expected to clear 5 cm of deposited sediment within a few tidal cycles.

Sensitivity assessment. Resistance has been assessed as '**High**', and resilience as '**High**'. Sensitivity has, therefore, been assessed as '**Not Sensitive**' at the benchmark level.

Smothering and siltation rate changes (heavy)	High Q: Low A: NR C: NR	High Q: High A: High C: High	Not sensitive Q: Low A: Low C: Low

Caryophyllia smithii, *Corynactis viridis* and bryozoans are sessile and thus would be unable to avoid the deposition of a smothering layer of sediment. Some *Alcyonium digitatum* colonies can attain a height of up to 20 cm (Edwards, 2008).

Caryophyllia smithii, *Corynactis viridis* and the bryozoan turf species within CR.HCR.XFa.CvirCri are small (approx. <5 cm height from the seabed) and would, therefore, be inundated in a "heavy" sedimentation event. However, Bell & Turner (2000) reported *Caryophyllia smithii* was abundant at sites of "moderate" sedimentation (7mm ± 0.5mm) in Lough Hyne. It is, therefore, likely that *Caryophyllia smithii* would be resistant to periodic sedimentation.

Suspension feeding organisms may be adversely affected by increases in suspended sediment, due to clogging of their feeding apparatus. Bryozoan turfs form preferentially on steep surfaces and under overhangs and larvae preferentially settle under overhangs, presumably to avoid smothering and siltation (Ryland, 1977; Hartnoll, 1983). Wendt (1998) noted that *Bugula neritina* grew faster on downward facing surfaces than upward facing surfaces, presumably due to siltation and reduced feeding efficiency on upward facing surfaces. But where water flow is sufficient to prevent siltation, *Bugulina turbinata* may colonize upward facing surfaces (Hiscock & Mitchell, 1980).

CR.HCR.XFa.CvirCri is recorded from moderately strong-strong tidal streams (0.5-3m/sec) and at very wave exposed to moderately wave exposed sites (Connor *et al*., 2004). Therefore, water movement (through wave action and/or tidal flow) would be expected to clear 30 cm of deposited sediment within a few tidal cycles.

Sensitivity assessment. Resistance has been assessed as '**High**', resilience as '**High**'. Sensitivity has therefore been assessed as '**Not Sensitive**'.

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	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

None of the characterizing species within CR.HCR.XFa.CvirCri have hearing perception but vibrations may cause an impact, however, no studies exist to support an assessment.

Introduction of light or shading	High Q: High A: High C: High	High Q: High A: High C: High	Not sensitive Q: High A: High C: High

CR.HCR.XFa.CvirCri is a circalittoral biotope and is thus by definition a naturally shaded environment, with low light levels. Increased shading (e.g. by the construction of a pontoon, pier etc) could be beneficial to the characterizing species within these biotopes.

Sensitivity assessment. Resistance is probably '**High**', with a '**High**' resilience and sensitivity is assessed as '**Not Sensitive**'.

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

Barriers and changes in tidal excursion are **'Not relevant'** to biotopes restricted to open waters.

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 grounding vessels is 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

'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

Caryophyllia smithii, *Corynactis viridis* and the bryozoan turf species are not cultivated or likely to be translocated. This pressure is therefore considered '**Not relevant**'.

Translocation also has the potential to transport pathogens to uninfected areas (see pressure 'introduction of microbial pathogens'). The sensitivity of the 'donor' population to harvesting to supply stock for translocation is assessed for the pressure 'removal of target species'.

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 regarding known invasive species which may pose a threat to CR.HCR.XFa.CvirCri.

Didemnum vexillum is an invasive colonial sea squirt native to Asia which was first recorded in the UK in Darthaven Marina, Dartmouth in 2005. *Didemnum vexillum* can form extensive mats over the substrata it colonizes; binding boulders, cobbles and altering the host habitat (Griffith *et al.*, 2009). *Didemnum vexillum* can also grow over and smother the resident biological community. Recent surveys within Holyhead Marina, North Wales have found *Didemnum vexillum* growing on and smother native tunicate communities (Griffith *et al.*, 2009). Due to the rapid-re-colonization of *Didemnum vexillum* eradication attempts have to date failed.

Presently *Didemnum vexillum* is isolated to several sheltered locations in the UK (NBN, 2015), however, *Didemnum vexillum* has successfully colonized the offshore location of the Georges Bank, USA (Lengyel *et al.*, 2009) which is more exposed than the locations which *Didemnum vexillum* have colonized in the UK. It is, therefore, possible that *Didemnum vexillum* could colonize more exposed locations within the UK and could, therefore, pose a threat to CR.HCR.XFa.CvirCri.

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

There was insufficient evidence on which to assess the sensitivity of the characterizing species within CR.HCR.XFa.CvirCri to current/known microbial pathogens. Epizooics were shown to reduce growth rates in *Flustra foliacea* (Stebbing, 1971a) and may have similar effects on other bryozoans. *Alcyonium digitatum* acts as the host for the endoparasitic species *Enalcyonium forbesi* and *Enalcyonium rubicundum* (Stock, 1988). Parasitisation may reduce the viability of a colony but not to the extent of killing them but no further evidence was found to substantiate this suggestion.

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

None of the characterizing species within CR.HCR.XFa.CvirCri are commercially exploited. This pressure is considered '**Not Relevant**'.

Echinus esculentus was identified by Kelly & Pantazis (2001) as a species suitable for culture for the urchin Roe industry. However, no evidence could be found to suggest that significant *Echinus esculentus* mariculture was present in the UK. Removal of *Echinus esculentus* from CR.HCR.XFa.CvirCri could cause an increase in algal growth which may limit the growth of faunal species (Bell & Turner, 2000; Connor *et al.*, 2004).

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

Faunal turf communities (as in CR.HCR.XFa.CvirCri) are probably resistant to abrasion through bottom fishing (see abrasion pressure). *Alcyonium digitatum* goes through an annual cycle, From February to July all *Alcyonium digitatum* colonies are feeding, from July to November an increasing number of colonies stop feeding. During this period a large number of polyps can retract and a variety of filamentous algae, hydroids and amphipods can colonize the surface of colonies epiphytically. From December-February the epiphytic community is however sloughed off (Hartnoll, 1975). If *Alcyonium digitatum* were removed the epiphytic species would likely colonize rock surfaces and are therefore not dependant on *Alcyonium digitatum*.

Within CR.HCR.XFa.CvirCri the characterising species spatially compete, however, no evidence was found to suggest other interspecific relationships or dependencies between these species. However, *Corynactis viridis* is a key turf forming species within this biotope, therefore, significant removal of this species would fundamentally alter the character of this biotope. Bryozoa may opportunistically colonize available space and limit successive.

Sensitivity assessment. Resistance has been assessed as '**Low**', resilience has been assessed as '**High**'. Sensitivity has been assessed as '**Low**'.

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