



MarLIN

Marine Information Network

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

Channelled wrack (*Pelvetia canaliculata*)

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

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A report from:

The Marine Life Information Network, Marine Biological Association of the United Kingdom.

Please note. This MarESA report is a dated version of the online review. Please refer to the website for the most up-to-date version [<https://www.marlin.ac.uk/species/detail/1342>]. All terms and the MarESA methodology are outlined on the website (<https://www.marlin.ac.uk>)

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See online review for
distribution map

Pelvetia canaliculata at the water's edge.

Photographer: Judith Oakley

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Distribution data supplied by the Ocean Biogeographic Information System (OBIS). To interrogate UK data visit the NBN Atlas.

Researched by	Nicola White	Refereed by	Dr Dagmar Stengel
Authority	(Linnaeus) Decaisne & Thuret, 1845		
Other common names	-	Synonyms	-

Summary

🔍 Description

A common brown seaweed found high on the shore. It is very tolerant of desiccation surviving up to 8 days out of the water. *Pelvetia canaliculata* lives for about 4 years and grows up to 15 cm long. The fronds of the algae are curled longitudinally forming a channel.

📍 Recorded distribution in Britain and Ireland

All coasts of Britain and Ireland

📍 Global distribution

Norway, Iceland, UK, Ireland, Atlantic coast of France, Spain and Portugal.

🏠 Habitat

Pelvetia canaliculata grows attached to hard substrata on the upper shore. It is found in a band above *Fucus spiralis* and can tolerate ultra sheltered to moderately exposed conditions.

↓ Depth range

Not relevant

🔍 Identifying features

- Frond curled longitudinally to form a distinct channel.
- Without midrib or airbladders.
- Reproductive bodies at ends of branches.
- Dichotomously branched.

🏛️ Additional information

Pelvetia canaliculata has an obligate endophytic fungus *Mycosphaerella acophylli* (Ascomycetes).

✓ Listed by

🔗 Further information sources

Search on:



Biology review

Taxonomy

Phylum	Ochrophyta	Brown and yellow-green seaweeds
Class	Phaeophyceae	
Order	Fucales	
Family	Fucaceae	
Genus	Pelvetia	
Authority	(Linnaeus) Decaisne & Thuret, 1845	
Recent Synonyms	-	

Biology

Typical abundance	High density
Male size range	Up to 15cm
Male size at maturity	4cm
Female size range	4cm
Female size at maturity	
Growth form	Shrub
Growth rate	3-4cm/year
Body flexibility	
Mobility	
Characteristic feeding method	Autotroph
Diet/food source	
Typically feeds on	
Sociability	
Environmental position	Epifloral
Dependency	Independent.
Supports	No information
Is the species harmful?	No

Biology information

Pelvetia canaliculata is very tolerant of desiccation. It may spend up to 90 percent of the time out of the water and can tolerate 65 percent water loss. The species can photosynthesise when exposed to air but may suffer nutrient stress as it can only obtain nutrients when submerged. The species supports an impoverished fauna due to the harsh physical conditions on the upper shore. A few species of wandering isopods and amphipods may be found sheltering underneath the fronds at low tide.

Habitat preferences

Physiographic preferences	Open coast, Strait / sound, Sea loch / Sea lough, Ria / Voe
Biological zone preferences	Lower littoral fringe

Substratum / habitat preferences	Bedrock, Cobbles, Large to very large boulders, Small boulders
Tidal strength preferences	Moderately Strong 1 to 3 knots (0.5-1.5 m/sec.), Strong 3 to 6 knots (1.5-3 m/sec.), Weak < 1 knot (<0.5 m/sec.)
Wave exposure preferences	Moderately exposed, Sheltered, Very sheltered
Salinity preferences	Full (30-40 psu), Variable (18-40 psu)
Depth range	Not relevant
Other preferences	No text entered
Migration Pattern	Non-migratory / resident

Habitat Information

- *Pelvetia canaliculata* is the highest living fucoid on the shore. The upper limits of the species distribution are controlled by its physiological tolerances, whereas its lower limits on the shore are controlled by its ability to compete with *Fucus spiralis*. *Pelvetia canaliculata* is capable of growing further down the shore but it is out-competed by faster growing species such as *Fucus spiralis* and is also heavily grazed. However, this is one of the few algae which requires regular aerial exposure to survive and prolonged submersion, such as in rockpools actually kills the algae.
- In moderately exposed conditions *Pelvetia canaliculata* is capable of growing above the high water mark, where it is supplied with water through spray and waves. In sheltered conditions it grows further down the shore where it will be immersed by spring tides but often not covered by neaps. It has been estimated that some plants spend up to 90 percent of their time out of the water (Fish & Fish, 1996).
- *Pelvetia canaliculata* lives in some lower salinity sites although the balance between the algae and the obligate endophytic fungus *Mycosphaerella ascophylli* seems to be affected (D. Stengel pers. comm.)

Life history

Adult characteristics

Reproductive type	Permanent (synchronous) hermaphrodite
Reproductive frequency	Annual episodic
Fecundity (number of eggs)	No information
Generation time	1-2 years
Age at maturity	1-2 years
Season	August - September
Life span	2-5 years

Larval characteristics

Larval/propagule type	-
Larval/juvenile development	Not relevant
Duration of larval stage	No information
Larval dispersal potential	No information

Larval settlement period

Insufficient information

Life history information

- **Age at maturity:**In Ireland *Pelvetia canaliculata* is at least two years old before it reaches maturity (D. Stengel pers. comm.)
- *Pelvetia canaliculata* produces gametes within receptacles on the tips of the fronds. Receptacles are initiated in January when they start to swell and become distinguishable. In July, the receptacles start ripening and gametes are released from August to early September, after which the receptacles are shed. Gametes are fertilised externally forming zygotes which then settle. A sporeling is produced of 800um length in six months. Plants first produce receptacles at a size of 4 to 5 cm long when they are in their first year.

Sensitivity review

This MarLIN sensitivity assessment has been superseded by the MarESA approach to sensitivity assessment. MarLIN assessments used an approach that has now been modified to reflect the most recent conservation imperatives and terminology and are due to be updated by 2016/17.

A Physical Pressures

	Intolerance	Recoverability	Sensitivity	Confidence
Substratum Loss	High	Moderate	Moderate	Moderate
<p><i>Pelvetia canaliculata</i> is permanently attached to the substratum, so would be removed upon substratum loss. Recovery rates may be variable, Subrahmanyam (1960) observed that the species readily recruits to cleared areas of the shore and full recovery of the community takes place within five years. However, in the Shetlands <i>Pelvetia canaliculata</i> did not recolonize shores that had been bulldozed until 7-8 years after the event.</p>				
Smothering	High	Moderate	Moderate	Moderate
<p>The effects of smothering depend on the state of the tide when the incident occurred. If smothering took place when the plant was emerged the whole of the plant may be buried under the sediment preventing photosynthesis. If smothering happened while the plant was immersed some of the fronds may escape smothering and be able to continue photosynthesis. Recovery rates may be variable, Subrahmanyam (1960) observed that the species readily recruits to cleared areas of the shore and full recovery of the community takes place within five years. However, in the Shetlands <i>Pelvetia canaliculata</i> did not recolonize shores that had been bulldozed until 7-8 years after the event.</p>				
Increase in suspended sediment	Low	Immediate	Not sensitive	Moderate
<p>Silt may settle out on the fronds reducing the light available for photosynthesis and therefore lowering growth rates. Siltation may prevent or certainly reduce recruitment (D. Stengel pers. comm.). Once conditions have returned to normal the growth rate would quickly return to normal.</p>				
Decrease in suspended sediment				
Desiccation	Intermediate	Moderate	Moderate	Moderate
<p><i>Pelvetia canaliculata</i> is very tolerant of desiccation, it can survive emerged for several days after reduction of its water content to just a few percent (Schonbeck & Norton, 1978). However, it cannot withstand desiccation beyond this and an increase in the normal desiccation levels would result in the death of some plants at the uppermost limit of its range. Thus, the upper limit of the <i>Pelvetia canaliculata</i> population would be depressed and so intolerance has been assessed as intermediate. Decreases in the level of desiccation would result in the species being competitively displaced by faster growing species and <i>Pelvetia canaliculata</i> may colonize further up the shore. Recovery rates may be variable, Subrahmanyam (1960) observed that the species readily recruits to cleared areas of the shore and full recovery of the community takes place within five years. However, in the Shetlands <i>Pelvetia canaliculata</i> did not recolonize shores that had been bulldozed until 7-8 years after the event.</p>				
Increase in emergence regime	Intermediate	Moderate	Moderate	Moderate
<p>Even on a regular basis, <i>Pelvetia canaliculata</i> can tolerate emersion for up to 8 days. However,</p>				

those individuals living at the highest level on the shore are living at the top of their physiological tolerance limits and so would not be likely to tolerate an increase in emersion levels. This would result in the upper extent of the species being depressed. Decreases in emersion would result in the species being competitively displaced by faster growing species and *Pelvetia canaliculata* may colonize further up the shore. The species requires exposure to air to survive, it decays if transplanted further down the shore (Lobban & Harrison, 1997). Thus, because some individuals in the population are likely to be killed intolerance is assessed as intermediate. Recovery rates may be variable, Subrahmanyam (1960) observed that the species readily recruits to cleared areas of the shore and full recovery of the community takes place within five years. However, in the Shetlands *Pelvetia canaliculata* did not recolonize shores that had been bulldozed until 7-8 years after the event.

Decrease in emergence regime

Increase in water flow rate Intermediate Moderate Moderate Moderate

An increase in water flow rate could cause plants to be torn off the substratum or the substratum with the plants attached may be mobilised. Recruitment may be reduced with an increased in water flow rates. A decrease may result in increased siltation which may also reduce recruitment. Subrahmanyam (1960) observed that the species readily recruits to cleared areas of the shore and full recovery of the community takes place within five years. However, in the Shetlands *Pelvetia canaliculata* did not recolonize shores that had been bulldozed until 7-8 years after the event.

Decrease in water flow rate

Increase in temperature Low High Low Low

Pelvetia canaliculata is found in much warmer and much cooler waters than the UK as it is distributed from northern Norway to Spain. It is likely to tolerate a change of 5°C in the short term although it showed some signs of damage during the unusually hot summer of 1983, when the average temperature was 8.3°C higher than normal (Hawkins & Hartnoll, 1985). The effect of such an increase The species is likely to be especially tolerant of a long-term change in temperature of 2°C.

Decrease in temperature

Increase in turbidity Tolerant Not relevant Not sensitive Moderate

An increase in turbidity levels would reduce light levels available for photosynthesis during immersion. However, it has been estimated that *Pelvetia canaliculata* spends up to 90 percent of its time out of the water (Fish & Fish, 1996) where photosynthesis can still take place whilst the thalli remains wet. Since the algae is able to photosynthesize during the early stages of emersion when the plant is still wet the overall effect of increased turbidity is likely to be minimal. A decrease intolerance has therefore, been recorded as low.

Decrease in turbidity

Increase in wave exposure High Moderate Moderate Low

An increase in wave exposure may cause *Pelvetia canaliculata* to be torn off the substratum or the substratum with plants attached may be mobilised. It is unlikely that any recruitment will occur in areas of high wave exposure. In such sites *Pelvetia canaliculata* can only grow in crevices. Recovery rates may be variable, Subrahmanyam (1960) observed that the species readily recruits to cleared areas of the shore and full recovery of the community takes place

within five years. However, in the Shetlands *Pelvetia canaliculata* did not recolonize shores that had been bulldozed until 7-8 years after the event.

Decrease in wave exposure

Noise Tolerant Not relevant Not sensitive Not relevant

Seaweeds have no known mechanism for perception of noise.

Visual Presence Tolerant Not relevant Not sensitive Not relevant

Seaweeds have no known mechanism for visual perception.

Abrasion & physical disturbance Intermediate Moderate Moderate Low

Abrasion may kill germlings and damage the fronds of *Pelvetia canaliculata*. Fucoids are intolerant of abrasion from human trampling which has been shown to reduce fucoid cover on a shore (Fletcher & Frid, 1996; Holt *et al.*, 1997). Therefore, an intolerance of intermediate has been recorded. Recovery rates may be variable. Subrahmanyan (1960) observed that the species readily recruits to cleared areas of the shore and full recovery of the community takes place within five years. However, in the Shetlands *Pelvetia canaliculata* did not recolonize shores that had been bulldozed until 7-8 years after the event (Keith Hiscock, pers comm.). Therefore, a recoverability of moderate has been recorded.

Displacement High Moderate Moderate Moderate

Pelvetia canaliculata is permanently attached to the substratum so once removed it cannot reform an attachment. Recovery rates may be variable, Subrahmanyan (1960) observed that the species readily recruits to cleared areas of the shore and full recovery of the community takes place within five years. However, in the Shetlands *Pelvetia canaliculata* did not recolonize shores that had been bulldozed until 7-8 years after the event.

Chemical Pressures

Synthetic compound contamination Intolerance Recoverability Sensitivity Confidence
Not relevant Not relevant

Insufficient information

Heavy metal contamination Low High Low Low

Fucoids are generally robust in the face of chemical pollution (Holt *et al.*, 1997). However, a 50% reduction in growth took place at copper concentrations of 60-80 micrograms per litre. Stromgren (1977) found the growth of *Pelvetia canaliculata* is actually enhanced by cadmium at concentrations as high as 1000 micrograms per litre although these experiments were not done under natural conditions and may not be applicable in the field (D. Stengel pers. comm.). The reproductive stages are likely to be the most intolerant.

Hydrocarbon contamination High Moderate Moderate Low

Pelvetia canaliculata disappeared from heavily oiled shores a couple of months after the Amoco Cadiz oil spill (Floc'h & Diouris, 1980). The intolerance of this species is thought to be due to the long residence time of oil on the algae caused by its position high on the shore. Recovery rates may be variable, Subrahmanyan (1960) observed that the species readily recruits to cleared areas of the shore and full recovery of the community takes place within five years. However, in the Shetlands *Pelvetia canaliculata* did not recolonize shores that had been bulldozed until 7-8 years after the event.

Radionuclide contamination Not relevant Not relevant

Insufficient information

Changes in nutrient levels Intermediate Moderate Moderate Low

Pelvetia canaliculata is adapted to living at low nutrient levels because it can only obtain nutrients when immersed, which may be for as little as 10 percent of its time. A decrease in nutrient levels would lower growth rate in the species. An increase in nutrient levels may cause the species to be overgrown by green algae. However, this is unlikely to have a great effect because most of these species, such as *Ulva*, are strongly seasonal and opportunistic and have only short life-spans. Recovery rates may be variable, Subrahmanyam (1960) observed that the species readily recruits to cleared areas of the shore and full recovery of the community takes place within five years. However, in the Shetlands *Pelvetia canaliculata* did not recolonize shores that had been bulldozed until 7-8 years after the event.

Increase in salinity Low Very high Very Low Low

Pelvetia canaliculata must be able to withstand wide variations in salinity because it is usually emerged for long periods of time, during which it will be drenched in freshwater from rain. There is recent evidence (D. Stengel pers. comm.) that although *Pelvetia canaliculata* can tolerate short-term changes in salinity the physiological balance between the alga and the fungus *Mycosphaerella* may be disturbed in low-salinity conditions in the long-term.

Decrease in salinity

Changes in oxygenation Not relevant Not relevant

Low oxygen levels are unlikely to affect *Pelvetia canaliculata* as seaweeds are photoautotrophic and do not need any oxygen for photosynthesis.

Biological Pressures

Intolerance Recoverability Sensitivity Confidence

Introduction of microbial pathogens/parasites Not relevant Not relevant

Insufficient information

Introduction of non-native species Not relevant Not relevant

Insufficient information

Extraction of this species Intermediate Moderate Moderate Moderate

Pelvetia canaliculata can recover quickly from harvesting if plants only greater than 14cm are removed. Otherwise recovery rates may be variable, Subrahmanyam (1960) observed that the species readily recruits to cleared areas of the shore and full recovery of the community takes place within five years. However, in the Shetlands *Pelvetia canaliculata* did not recolonize shores that had been bulldozed until 7-8 years after the event.

Extraction of other species Not relevant Not relevant Not relevant Not relevant

NR

Additional information

Importance review

Policy/legislation

- no data -

★ Status

National (GB)
importance -

Global red list
(IUCN) category -

Non-native

Native -

Origin -

Date Arrived -

Importance information

Pelvetia canaliculata was historically harvested for use as animal fodder. Sheep still graze *Pelvetia canaliculata* on the shore in Shetland at least.

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