

PICTURES TO HELP WITH IDENTIFICATION OF *FUCUS* SPECIES FROM THE BRITISH ISLES

Compiled by **HOLLY BROWN** and **MARTIN WILKINSON**,
School of Life Sciences, Heriot-Watt University,
Edinburgh, Scotland

Although this guide contains open coast and estuarine species, it is primarily directed at helping with *Fucus* identification for the purposes of the draft Furoid Extent tool for quality assessment in transitional waters for the EC Water Framework Directive. Accordingly it does not contain all open coastal variations, nor the various forms of the Arctic furoid, *Fucus distichus* found only on open coasts in northern Scotland and western Ireland.

Furoids in Upper Reaches of Estuaries



Bed of furoids in a large estuary attached to small rocks and pebbles in mud. River wall does not go deep enough in intertidal zone to include furoid zone. (Otterspool, Mersey estuary)



Furoids attached to river wall where this goes deep enough, in this case right down to water level at low tide.(Heybridge, Blackwater estuary)



Furoids at edge of saltmarsh, even growing in some estuaries attached to the salt-marsh cliff.



Furoids on sand and mud flat of a small, completely flushed estuary. This is in the lower estuary and there is a mixed furoid community here, but further upstream only *F.ceranoides* is present. (Ffraw estuary, Anglesey)



Above is a salt marsh fucoid from the marsh surrounding the channel of the Creran estuary in Scotland.

To the right is a typical upper estuarine shore with an upper green band and a lower fucoid band (*Fucus spiralis*) with a very sparse understory of other species. Riverside Park, Middlesbrough, Tees estuary.



Fucus ceranoides

F. ceranoides is found in areas always exposed to freshwater during some part of the tidal cycle and grows on rock and stones of all sizes.

Typical Form

Fucus ceranoides has a delicate thallus with regular dichotomy, but no air bladders. Frond repeatedly and regularly forked.

Relatively thin and delicate thallus, yellowish or olive brown in colour

Lateral branches much narrower than main axis

Crisp and papery flattened frond

Often irregular elongated inflations (false bladders) running along either side of the well marked midrib

Appearance of the pointed receptacles at apex gives rise to the common name horned wrack



Fucus ceranoides

Variations in morphology – overall appearance of the furoid mat



Creed estuary, Stornoway, Isle of Lewis



Loch Etive, strongly estuarine sealoch



Herston, Orkney



Exe estuary, Devon, England



Morar estuary, Inverness-shire, Scotland



Sea Loch form

Fucus ceranoides - appearance at limit of penetration

At the limit of penetration plants are stunted and slender with a very narrow main axis. Populations are found in low numbers. Stunted plants may not be easy to identify to species level but it is a safe assumption that where a single species has dominated the upper estuary, as is the usual case, it will be the same species in stunted.



Ffraw estuary, Anglesey, close to the tidal limit shown in the two photos to left. Interspersed with the dominant green seaweeds are small stunted plants of *F.ceranoides* which are permanently submerged shown below to left.



Seaton Burn limit, Seaton Sluice, Northumberland (above and below)



Fucus ceranoides

F.ceranoides is always found in areas exposed to freshwater during some part of the tidal cycle and is found to grow on rock and stones of all sizes.

Fucus ceranoides has a delicate thallus with regular dichotomy, but no air bladders. Longitudinal thin-walled inflations (false bladders or “boursouffloures”) are often present but can occur in other species exposed to low salinities

Variation in form of *F.ceranoides* accompanies decreasing salinity towards river outlets e.g. size.

Reduction in the size of *F.ceranoides* and decreased sexual reproduction has been attributed to high turbidity in estuaries

Hybrid forms of *F.ceranoides* plants have been found with longer receptacles

Irregular swellings caused by gas accumulation occurred at the tips of the tissue in both species

Further upriver, the thallus of *F.ceranoides* became slender and reduced in size

At the inner limit of its distribution the thalli contained many branches

Fucus spiralis

Olive brown or yellow in colour

Frond is tough and flattened

Midrib conspicuous

Typically *F. spiralis* has spirally twisted frond

Swollen receptacles

Receptacles have a distinct rim around the edge, as if moulded in two pieces



False bladders on *Fucus spiralis*

Brackish water forms of *F. spiralis* can form elongated inflations alongside midrib which has a resemblance to the inflations on *F. ceranoides*



F. spiralis with shorter inflation, the inflations also have a more rounded appearance at the tip.



F. ceranoides with larger inflations

Fucus spiralis- estuarine form

Estuarine *F.spiralis* showing the dense branching pattern and the narrower fronds than in open coast representatives of the same species.



Estuarine form



Coastal form

Fucus spiralis

F. spiralis variation of morphology



Stunted form



Sea loch



Saltmarsh form



Upright form

Fucus spiralis ecads or varieties

Fucus spiralis var. *nanus*

Fucus spiralis var. *nanus* is a dwarf form of *F. spiralis* and is rare and probably would not be found in an estuary.



Flamborough

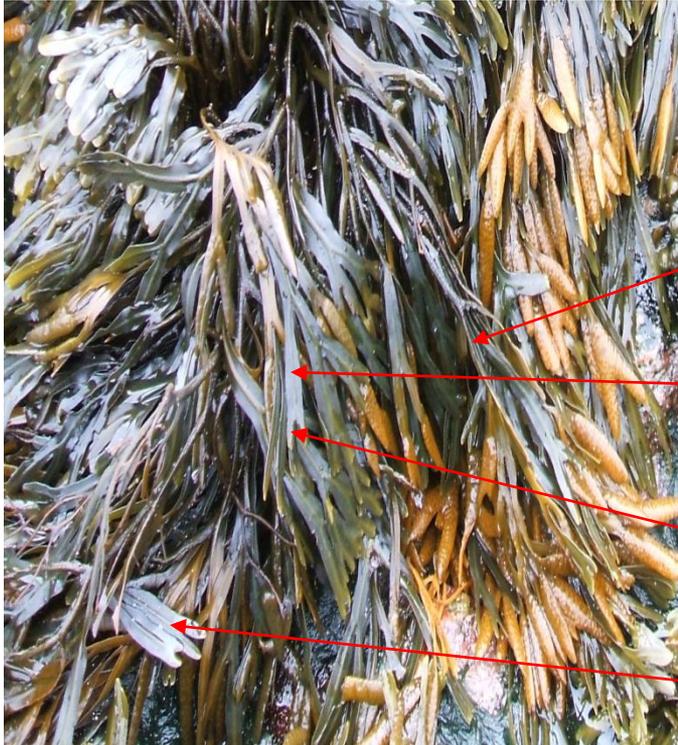


Flamborough

Fucus vesiculosus

Without air bladders
on exposed shores

Air bladders in pairs on
sheltered shore



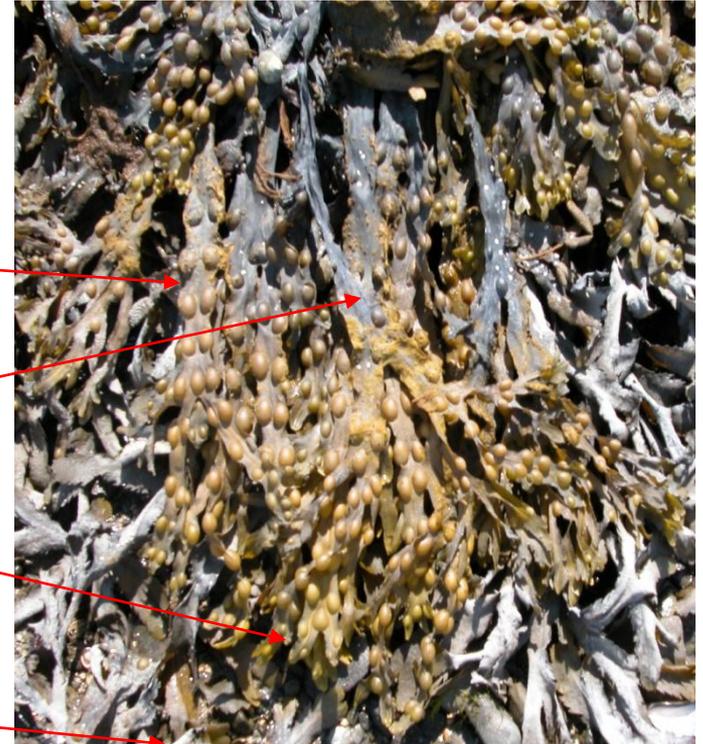
Olive green or
brown in colour

Smooth frond edge

Distinct
midrib

Fronds repeatedly
forked

Frond tough and
flattened with
entire margins



F. vesiculosus in low salinity has been found with significantly shorter thalli, shorter intervals from the holdfast to the oldest dichotomy and smaller fronds, stipe and midrib widths when compared to more marine locations. Receptacles are rounded off or slightly pointed and air vesicles are absent. There is no flange of sterile tissue forming a rim around the receptacle.

Fucus vesiculosus- Receptacles

Receptacles without distinct rim around edge, such as is found on *F. spiralis*



When ripe receptacles are swollen, often orange in colour and spotted with conceptacles

Receptacles elongate



Fucus vesiculosus- air bladders

Fucus vesiculosus Air bladders spherical, paired and one on either side of midrib



At the salinity boundary the air bladders were found to be completely absent .

A reduction in size and number of air bladders has been found in low salinity populations

F.vesiculosus variation in morphology, on sheltered shores plants have many air bladders.



F. vesiculosus on exposed shores, lack air bladders. Forms without bladders also occur in estuaries.



Estuarine form without bladders, above



Erect form in most severe wave action, Mangersta, Lewis



Spiral form of *Fucus vesiculosus*

The spiral form of *F. vesiculosus* can be confused with *F. spiralis*., However the air bladders are a distinct feature of *F. vesiculosus*.



F. spiralis



F. vesiculosus

Fucus vesiculosus varieties and hybrids

Fucus vesiculosus var *linearis* and a *Fucus spiralis*/*Fucus vesiculosus* hybrid



Fucus vesiculosus var *linearis*

Terminal receptacles

New fronds regenerating from base of
plant



Suspected hybrid of *F.spiralis* and
F.vesiculosus

Has air bladders but frond is spiralled

Fucus serratus

Fucus serratus forms a distinct zone in the littoral and shallow infralittoral zones, it is never been found in the upper reaches of estuaries but may be extensive in lower reaches.

Receptacles flat, dry and lumpy
often orange in colour (male
plants) or olive-green (female)

Air vesicles are absent

Distinct midrib



Margin of frond serrated

Fucus muscoides (= *F. cottonii*)

Fucus muscoides is a small salt marsh furoid, it is very stunted in size and is sterile. It can penetrate into the upper reaches of estuaries where these have salt marshes.



Above and to the right is the more straggly form a few cm long.



Above is a close solid turf of tiny plants

