

Proceedings of the North East Kent  
Coastal Research Workshop  
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**Proceedings of the North East Kent Coastal Research Workshop,  
22 October 2002, Sandwich Bay Bird Observatory**

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## *Introduction*

The North East Kent coast encompasses the area between Whitstable and Deal, stretching all the way around the Thanet Coast. The area is important for a range of coastal habitats including a 26km stretch of chalk cliffs and reefs, plus shingle, sand dunes, mudflats, saltmarsh and soft cliffs. It is also important for some of its wintering bird species. The area has a number of national and international nature conservation and geological designations including a Special Protection Area (SPA) for turnstone and golden plover; two candidate Special Areas of Conservation (cSACs) for chalk reefs and caves and sand dunes; a Ramsar Site for its bird and invertebrate interest; and two Sites of Special Scientific Interest (SSSI) for various geological and nature conservation features. Collectively, those parts of all the designated sites which are covered some or all of the time by seawater are known as the North East Kent European marine sites.

The North East Kent Coastal Research Workshop held in October 2002 at Sandwich Bay Bird Observatory provided the first opportunity for scientists engaged in a wide range of coastal environmental research in the area to come together to share information.

The need for an event of this kind was identified when the North East Kent European marine sites Management Scheme was produced in 2001. The Management Scheme was written using a technique known as 'stakeholder dialogue' where local people affected by a decision or course of events are involved in making the decisions themselves. Scientists were among the stakeholders and they decided that this event would help with sharing knowledge and planning future research. Some of the more detailed questions addressed by participants in workshop sessions at this event also came out of the Management Scheme process.

The day consisted of a series of presentations on a range of coastal research topics, followed by whole group discussion sessions and small group workshops. Feedback was very positive and many people made new contacts or reinforced existing links. There were a number of suggestions for further action and events.

Since then, a new North East Kent Coastal Advisory Group has been formed, with sub-groups looking at producing a code of conduct for coastal researchers, setting up a research database and setting up a shellfish harvesting sustainability study. The group plans to hold a second major event in 2004.

This report provides a brief summary of each workshop/discussion session together with the research papers presented. A full verbatim write-up of each workshop session is also available on request from English Nature's Kent Team.

## *Attendance list*

<b>Name</b>	<b>Organisation</b>
John Badmin	Canterbury Christchurch University College
Fred Booth	Kent Field Club
Doug Brown	Thanet District Council
Alasdair Bruce	Geologist
Phil Buckley	Canterbury Christchurch University College
Tony Child	Thanet Coast Project
Nick Delaney	Dover District Council
Alastair Dussart	Canterbury Christchurch University College
Georges Dussart	Canterbury Christchurch University College
Diana Franks	Kent RIGS Group
Jon Ford	Environmental Consultant
Pete Forrest	Kent Wildlife Trust
Norman Foulkes	Thanet District Council
Mike Frost	Southern Water
Sam Gardner	University College London
Peter Golding	Kent RIGS Group
Martin Griffiths	Appletree Environmental
Ian Harding	Environmental Consultant
Phillipa Harrison	Environment Agency
Tim Hodge	Kent Ornithological society
Mike Humber	Thanet District Council
Ian Humpheryes	Environment Agency
Bernie Lambert	Thanet District Council
Raymond Lee	Marine Wildlife Assessments
Dave Lowthion	Environment Agency
Joe McCarthy	Thanet District Council
Sarah Maloney	Canterbury City Council
Geoff Meaden	Canterbury Christchurch University College
Jan Pritchard	Swale Wader Group
Severine Rees-Jones	Environment Agency
Philip Rogers	Canterbury Christchurch University College
Robin Shrubsole	Kent RIGS Group
John Stroud	Sea Fisheries Committee
Nick Tardivel	Lloyd Bore
Ian Tittley	Natural History Museum
Laurence Tricker	Kent County Council
Jackie Trigwell	Canterbury Christchurch University College
Jo Wadey	Thanet District Council
Brian Watmough	Canterbury City Council
Kevin Webb	Tumstone Researcher
Margaret Wright	Medway Swale Estuary Partnership
Mike Walkey	Durrell Institute of Conservation & Ecology, UKC



## ***Summary of workshops and whole group sessions***

### ***Whole Group Session: Setting up a Coastal Research Database***

The group addressed the following questions:

#### **1. What research have we already got for Thanet and of relevance from elsewhere?**

Research for the area was brainstormed and listed under a number of headings: human impacts, ecology, physical environment, fishing/harvesting, water quality and general sources of information. In most cases sources of the research were known and also listed.

#### **2. What are the research topics/questions we would most like addressed?**

This links to the first question. Writing the initial list helped with identification of ‘gaps’ in research, or further questions arising out of existing research. A ‘wish list’ of future research was produced under a number of headings: wider/underlying questions; water quality; geology; birds; human use; ecology; and coastal processes/management.

#### **3. How do we improve science knowledge for this coast?**

The group considered this question by firstly looking at barriers to improving science knowledge and then considering how to overcome these. Main barriers identified included poor communication, inaccessible information and lack of central co-ordination of research efforts. Suggested solutions included running regular seminars/events, setting up a central database for all North East Kent coastal research and making links to existing sources of data and research.

### ***Workshop 1: Developing a Code of Practice for Coastal Researchers***

This group looked at writing a specific code of practice for researchers on the North East Kent Coast. A number of organisations and research institutions already have their own codes but there are issues specific to this area which could be incorporated into a new code.

The group considered:

- Areas of research identified as relevant to this area of coast.
- Generic principles applicable to all research.
- Specific hazards relating to this area.
- Damage which could be caused to the special interest features of the North East Kent coast by researchers on site.

Since the workshop, a small sub-group has been formed and is producing the new code.

## ***Workshop 2: The Habitats Directive & Water Framework Directive & biological monitoring: understanding the marine biotopes of North East Kent***

This discussion considered the following questions:

- Why are some areas plant dominated and others animal dominated?
- Does succession occur?
- What can we use as indicators of man-influenced change?
- Are changes desirable or not?
- Invasive/non-native species issues.
- What to monitor & how; can we have a single set of information for Habitats Directive and Water Framework Directive monitoring?

More questions were raised that answered in this session & the issues need further consideration. There was no clear view as to whether monitoring under the two directives can be combined but it may be possible with some elements.

## ***Workshop 3: A project to investigate the sustainability of shellfish harvesting on the North East Kent Coast***

Relatively little is known about this, particularly in relation to harvesting of species like periwinkles and mussels undertaken by hand on the chalk reefs. It is therefore not known whether what happens takes place at sustainable levels or not.

The group considered:

- What existing research is there?
- What are our information needs?
- How would such a project be funded and set up?

Since the workshop, a small group has been formed to work up a proposal based on these initial discussions.

## ***Whole group session: What would you like to happen next & how can you help achieve it?***

At the end of the day, participants were asked to list the things they would like to see as next steps. The main suggestions were:

To receive feedback from the event – a verbatim summary of all the workshop sessions was sent to all participants.

- To set up a North East Kent coastal science group to co-ordinate action and move things forward – North East Kent Coastal Advisory Group is now in place.

- More workshops/events – a second major event is planned for 2004.
- Set up central research database – Database Working Group set up to take this forward.
- Progress code of conduct – underway.
- Progress shellfish harvesting sustainability study – underway.



# *The Thanet coast: A site with an exceptional history of marine study*

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## *Introduction*

The Isle of Thanet is one of only a few places in Britain where there exists a long recorded history and continuity of marine research. The wealth of unpublished manuscript information, published literature, survey reports, specimen records, particularly for the marine vegetation, allows the creation of a historical profile for the past centuries. This paper will briefly consider this historical profile. While previous information was collected for personal interest or academic research, today it is required more for statutory purposes for decision-making and management of the coastal zone environment. The need for collating these data as a permanent record for future use is suggested.

## *Early period (1597-1799): the first records*

Although man's contact with the sea around Thanet in Kent goes back a long time, the earliest reliable written records of marine plants are at most four centuries old. Earlier interest in marine plants concerned their social, medical and economic uses. For example, a local industry at Margate collected and burned kelp and wrack to produce 'potash'. Farmers gathered drift algae for use as manure, and fishmongers used algae to pack shellfish for transport and decorate shellfish stalls at markets (*Ulva lactuca* was known as 'Oister Greene').

In the late sixteenth century the first records of marine plants and animals were systematically collected and included marine algae from Kent and the Isle of Thanet. These species records are among the earliest published for the British Isles and probably for the world. Interest in the flora and fauna of the Kent coast reflected its cultural, economic, and geographical importance. The algae *Corallina officinalis* (red algae, Rhodophyta), *Fucus vesiculosus* (brown algae, Phaeophyta; see Figure 1A) and *Ulva lactuca* (green algae, Chlorophyta) were cited in a sixteenth century 'herbal' (Gerard, 1597). The author, John Gerard, stated "...These mosses grow in the sea upon the rocks, and are oftentimes upon Oyster shells, Muskell shells, and upon stones. I found verie great plentie thereof under Reculvers and Margate, in the Isle of Thanet; and at other places in the sands from thence unto Dover...". 'Herbals' were systematic accounts of plants (and animals then mistaken for plants) believed to be of medicinal value that, as indicated above, also provided rudimentary ecological information. In a later 'herbal', Johnson & Gerard (1633) recorded key elements of the marine flora at Margate. Their book itemised *Fucus serratus*, *F. vesiculosus* (see Figure 1C), *Halidrys siliquosa*, *Laminaria digitata*, *Laminaria saccharina* (see Figure 2D), *C. officinalis*, *Palmaria palmata* and *U. lactuca*. These early literature records are confirmed by early specimen collections, the most important being the Sloane Herbarium at the Natural History Museum (BM; Figures 1A,B) and the Dillenian and Sherardian Herbaria at Oxford University (OXF). A recent survey of intertidal foreshores on Thanet (Tittley *et al.*, 1998) showed that these species today form the principal features of the intertidal vegetation at Margate and elsewhere. The confirmation of these early algal records suggests medium-term stability in the marine flora of Thanet. Similarly, persistence of key animal species is attested

to by *Fucus spongiosus nodosus*, the soft coral *Alcyonium digitatum*, also in these early publications and specimen collections. *A. digitatum* is a species that characterises subtidal biotopes and is commonly washed ashore as drift.

Although Margate was cited by botanists of the seventeenth and eighteenth centuries (eg Hudson, 1798; Withering, 1776) in their lists of marine algae, many of their records were imprecise as earlier sources of information were repeated incorrectly. Early information should therefore be treated with caution and past records carefully checked; they should also be checked against modern nomenclatural and taxonomic concepts, and if voucher specimens are available they can be accurately authenticated.

### ***Middle period (1800- 1930): flourishing of natural history***

The growing of interest in natural history in the nineteenth century resulted many additional species records of marine algae in the published literature. This is shown in Table 1 that lists the algae recorded from Thanet in fifty-year intervals from 1550. The development and availability of the compound microscope in the nineteenth century facilitated more accurate appraisal of specimens collected especially smaller forms.

The main sources for algal records appeared were:

- Technical works (eg Buffham, 1888).
- Systematic accounts (eg Withering, 1830; Smith, Sowerby & Johnson, 1846).
- Compendia (eg Camden & Gough, 1806; Hasted 1799; Batters, 1902; Holmes, 1908).
- Floras (eg Holmes, 1881).
- Guides (eg Hunter, 1809; Allom 1841).
- Specimen collections (eg *Seaweeds of the Isle of Thanet*, Gisby collection -Ramsgate Museum; Walter collection – Rochester museum).
- Field notes (eg J.T. Neeve manuscripts – Folkestone museum).

An example of a local person with a keen interest in the coast and its natural history was R.E. Hunter, a surgeon resident at Margate, who published guides to the Isle of Thanet and contributed towards the study of the local flora. Hunter produced one of the most detailed local lists of algae in Kent (Hunter, 1809), citing 51 species from locations around Thanet. A keen amateur naturalist was Elizabeth Allom who lived at Ramsgate and recorded 36 species (Allom, 1841) of algae and illustrated these with pressed specimens.

By the mid nineteenth century specimen collecting and exchanging was at its peak facilitated by improved communication and networking (railways enabled easy and fast access to collecting locations and the postal system allowed speedy transmission and exchange of specimens and correspondence). Leading phycologists of the time built up extensive specimen collections, including material from Thanet supplied by local collectors. Many of the specimens collected are now at the Natural History Museum (BM). These specimens are important as, assuming they are accompanied by adequate information, they are verifiable records of a species' existence in space and time (see Huxley & Bryant, 1998).

Collecting and recording in Thanet in the early twentieth century in contrast to the late nineteenth century had declined considerably with only sporadic specimens gathered and few publications on the marine algae.

### ***Later period (1930 – 1980); scientific studies***

In the 1930s P.L. Anand (a PhD student at the University of London) undertook a detailed taxonomic and ecological study of the algal flora of the British chalk cliffs. This was the first thorough ecological study in Thanet as previously field-work had been largely concerned with species recording. Anand's study was undertaken on the cliffs at Westgate with comparison investigations at Ramsgate, and Beachy Head in Sussex. The field visits from which his published data were derived were made at fortnightly or monthly intervals from 1933 to 1935. His ecological studies (Anand, 1937a, b) involved:

- Descriptions of the algal communities.
- Factors affecting zonation, including water relations.
- Physical environmental effects such as salt concentration and temperature.
- Factors causing modifications on cliff faces.
- Special features of caves and tunnels.

Anand's ecological research resulted in the recognition of algal communities unique to chalk, while the taxonomic component (Anand, 1937c) resulted in the description of two new genera, 7 new species, and records of 48 species of red, brown and green algae, and 7 species of so-called 'Chrysophyceae'. Westgate and Ramsgate are thus the type locations for some of these algal taxa. Sadly, Anand's voucher collections of chalk cliff algae have been lost. However, it is known from brief published statements and a specimen in BM of *Apistonema carterae* collected from Margate in July 1845, that these unusual algal communities of chalk cliffs have probably been persistent feature on the Thanet coast.

In the late 1960s J.H. Price and I. Tittley of the Natural History Museum (BM) commenced a period of intensive marine studies on the marine algae of Thanet and Kent generally. This resulted in historical (Price & Tittley, 1972), floristic, distributional (Tittley & Price, 1977; Tittley *et al.*, 1985), and ecological (Tittley & Price, 1978) accounts, as well as an extensive specimen collection. 170 algal species (including drift and doubtful records) were mapped in Thanet. Contemporaneously R.L. Fletcher of the University of Portsmouth commenced detailed taxonomic studies on the small, crustose, species of brown algae (Fletcher, 1987).

In the late 1970s further study of the algal communities on chalk cliffs was undertaken (Tittley & Shaw, 1980); the occurrence of algae on natural chalk and man-made surfaces were compared with the results of Anand (1937a). The chalk cliff communities described by Anand, such as those characterised by *Chrysotila lamellosa*, *Apistonema carterae* were not found on non-chalk substrata, and other species listed by Anand were presumed locally extinct due to habitat loss.

Excessive growths of the green alga *Ulva lactuca* (a species that occurs naturally in Thanet) suggested that the inshore waters around the area were periodically high in nutrient levels (Fletcher, 1974).

## ***Final period 1980 to date: statutory studies***

The 1980s represent a transition period in which marine biological data were increasingly acquired for coastal management purposes, and habitat and species conservation. Statutory requirements arising from the EU *Urban Wastewater, Habitats and Water Framework Directives* require the regular collection of marine algal and also faunal information.

The ecological significance of the chalk cliff and foreshore species and communities at Botany Bay and White Ness led the former Nature Conservancy Council (NCC) to designate that area as a Site of Special Scientific Interest (the first marine SSSI in Britain). The extent and state of the chalk cliff habitat and algal communities of Thanet was undertaken for NCC (Tittley, 1985; Fowler & Tittley, 1993). Although the presence of most of the species recorded by Anand (1937c) was confirmed, the loss of extensive length of chalk cliff and cave microhabitats has, as mentioned above, caused the local extinction of some species. An Environmental Impact Assessment on the possible effects of an extension to Port Ramsgate and road link on the marine fauna and flora of the cliffs and foreshore was undertaken in the Pegwell Bay area (Anon. 1986) and identified the key species and communities.

The fauna, flora and communities of the subtidal environment around Thanet had long been overlooked. In the late 1980s the Marine Conservation Society undertook for NCC a first diving survey of sublittoral chalk habitats at Botany Bay (Wood, 1992) and recorded a depauperate fauna (17 species) and flora (1 species).

A comprehensive ecological study and assessment of marine biodiversity of chalk shores was undertaken at sites from Thanet to Brighton (Tittley *et al.*, 1986 for NCC); based on these data George & Fincham (1989) analysed the invertebrate communities in greater detail. In total, 69 species of algae and 105 species of invertebrates and Ascidea were listed for Thanet.

The *Habitats Directive* promotes the conservation of habitats and species in the EU and in 1995 the Thanet Coast was selected as a candidate Special Area of Conservation (cSAC) because of the conservation importance of its sea-caves and reef habitats. As a consequence, in 1997 a detailed survey of chalk cliff, cave, intertidal and subtidal reef biotopes in the Thanet cSAC was undertaken (Tittley *et al.*, 1998) for English Nature on behalf of all the Relevant Authorities, in order to assist the development of a management scheme for the site (Tittley *et al.*, 1998; Anon., 2001). The extent of intertidal reef and cave biotopes were mapped and sites were identified for monitoring. Mapping revealed for example, that the invasive brown alga *Sargassum muticum* first recorded at Margate in 1988, occupied less than 5% of the total intertidal area and therefore did not represent a threat to the site. Dense smothering growths of *Enteromorpha* spp. and *Ulva lactuca* reminiscent of a 'green tide' were recorded over red algal characterised biotopes. The '*Habitats Directive*' requires monitoring studies to confirm a 'favourably maintained status' of the Thanet Coast SAC, and thus in 2001 the condition of the sea-cave and reef biotopes were re-assessed (Tittley *et al.*, 2002). The study revealed little change in the principal biotopes in extent and species content since 1997; 54 species of algae were confirmed present at that time.

## ***Natural history***

Cultural and educational activities continue to make contributions to marine biological study. Regular field meetings in Thanet held by the Kent Field Club have created a pool of species records for the area while students of Dane Court Grammar School have undertaken intertidal



biotope mapping surveys on the foreshore reef between Walpole Bay and Foreness Point (Anon., 1998). The planned *Seasearch* project for Kent will also yield additional intertidal and subtidal marine biological data.

### ***Conclusion: Data, a resource for the future?***

Marine biological data are acquired and required by many parties with an interest in the Thanet coast (national agencies; local and county authorities; industry; wildlife NGOs; educational establishments; research organisations). Of principal interest are monitoring study data that may identify stasis or change in local biodiversity and ecology. At present such data are dispersed and not easily accessible. As a general principle, and to avoid unnecessarily repeated research, is it not desirable that Thanet data where at all possible (some are private) be made freely and easily available to all users? It is predicted here that increasing amounts of marine biological information will be gathered from Thanet. Is it possible for interested parties to agree a means for the collation and maintenance of this potentially large amount of marine biodiversity data as a resource for future use?

### ***Acknowledgement***

I would like to thank Jim Price formerly of the Natural History Museum for his contributions to the field study of the marine algae of Thanet and the collation of past specimen and literature data.

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**Table 1. Algae recorded from Thanet 1550 – 2000**

Records from:	1550	1600	1650	1700	1750	1800	1850	1900	1950
<b>Chlorophyta species:</b>									
<i>Acrosiphonia arcta</i>								■	■
<i>Blidingia minima</i>								■	■
<i>Bryopsis hypnoides</i>						■			
<i>Chaetomorpha ligustica</i>									■
<i>Chaetomorpha linum</i>									■
<i>Chaetomorpha melagonium</i>							■		■
<i>Cladophora albida</i> 3/4							□		
<i>Cladophora fracta</i> 4							□	□	
<i>Cladophora hutchinsiae</i> 4							■		
<i>Cladophora laetevirens</i> 4							■		
<i>Cladophora lehmanniana</i> 3						■			
<i>Cladophora pellucida</i> 4							■		
<i>Cladophora rupestris</i>						■	■		■
<i>Cladophora sericea</i>							■		■
<i>Codiolum polyrhiza</i>									■
<i>Ectochaete wittrockii</i> 4							■		
<i>Enteromorpha clathrata</i>						■	■		
<i>Enteromorpha compressa</i>						■	■	■	■
<i>Enteromorpha intestinalis</i>						■		■	■
<i>Enteromorpha linza</i>							■		■
<i>Enteromorpha muscoides</i> 4							■		
<i>Enteromorpha prolifera</i>								■	■
<i>Enteromorpha torta</i>									■
<i>Epicladia perforans</i>								■	■
<i>Epicladia viridis</i>								■	
<i>Eugomontia sacculata</i>									■
<i>Gomontia polyrhiza</i>								■	
<i>Prasiola stipitata</i>									■
<i>Pringsheimiella scutata</i>								■	■
<i>Pseudoclonium submarinum</i>									■
<i>Pseudulvella applanata</i>								■	■
<i>Rhizoclonium tortuosum</i>							■	■	■
<i>Ulothrix implexa</i> 3								■	
<i>Ulothrix pseudoflacca</i> 3								■	
<i>Ulothrix subflaccida</i> 3								■	
<i>Ulva lactuca</i>		■				■	■	■	■
<i>Ulvaria obscura</i>								■	
<i>Urospora penicilliformis</i>									■
<i>Urospora speciosa</i>								■	
<i>Urospora wormskioldii</i>								■	
Total 39 (out of 95 for the British Isles)	0	1	0	0	0	7	13	18	22
Drift/doubtful spp.							2	1	
Cumulative totals (incl. drift spp.)	0	1	1	1	1	7	18	31	40

Records from:	1550	1600	1650	1700	1750	1800	1850	1900	1950
<b>Rhodophyta species:</b>									
<i>Acrochaetium daviesii</i>									■
<i>Acrochaetium secundatum</i>							■		■
<i>Acrochaetium sparsum</i> 4								■	
<i>Ahnfeltia plicata</i>						■	■	■	■
<i>Antithamnion cruciatum</i>									□
<i>Antithamnion plumula</i>								■	■
<i>Apoglossum ruscifolium</i> 1							■		■
<i>Bangia fuscopurpurea</i>						■			■
<i>Bostrychia scorpioides</i> 3							□		
<i>Calliblepharis ciliata</i>						■	■		■
<i>Calliblepharis jubata</i> 3						□	□		
<i>Callophyllis laciniata</i> 3/4						□	□		
<i>Catenella caespitosa</i>							■	■	■
<i>Ceramium ciliatum</i> 4						□			
<i>Ceramium diaphanum</i>							■		■
<i>Ceramium deslongchampii</i>							■	■	■
<i>Ceramium echionotum</i>							■		
<i>Ceramium fastigiatum</i>						■	■		
<i>Ceramium gaditanum</i>							■	■	■
<i>Ceramium rubrum</i>						■	■	■	■
<i>Ceramium shuttleworthianum</i> 4						■	■		
<i>Chondria dasyphylla</i>						■	■		
<i>Chondria tenuissima</i> 4					■	=			
<i>Chondrus crispus</i>						■	■		■
<i>Coccotylus truncatus</i> 1/4							□		
<i>Corallina officinalis</i>	■	■	=				■		■
<i>Cryptopleura ramosa</i>						■	■		■
<i>Cystoclonium purpureum</i>							■		■
<i>Delesseria sanguinea</i> 1						■	■		□
<i>Dilsea carnosa</i> 4						■	■		
<i>Dumontia contorta</i>							■		■
<i>Erythropeltis discigera</i>									■
<i>Erythrotrichia carnea</i>									■
<i>Erythrotrichia ciliaris</i>							■		
<i>Furcellaria lumbricalis</i>						■	■		■
<i>Gastroclonium ovatum</i> 3							□		
<i>Gelidium crinale/pusillum</i>							■	■	■
<i>Gelidium latifolium</i> 3							□		
<i>Gracilaria 'verrucosa'</i>							■		■
<i>Griffithsia corallinoides</i>									■
<i>Gymnogongrus crenulatus</i>						■	■		■
<i>Halopitys incurvus</i> 1							□		
<i>Halurus equisetifolius</i>						■	■		■
<i>Halurus flosculosus</i>						■	■		■
<i>Haraldiophyllum bonnemaisonii</i> 1									□
<i>Heterosiphonia plumosa</i> 1						■	■		■
<i>Hildenbrandia rubra</i>								■	■
<i>Hypoglossum hypoglossoides</i>						■	■		■
<i>Jania rubens</i> 4							□		
<i>Lomentaria articulata</i>						■	■		■
<i>Lomentaria clavellosa</i> 3/4							□		
<i>Lomentaria orcadensis</i> 3/4							□		
<i>Mastocarpus stellatus</i>						■	■		■
<i>Osmundia hybrida</i>							■		■
<i>Osmundia pinnatifida</i>						■	■		■
<i>Membranoptera alata</i>						■	■		■

Records from:	1550	1600	1650	1700	1750	1800	1850	1900	1950
<b>Rhodophyta species:</b>									
<i>Naccaria wiggii</i> 4							□		
<i>Nitophyllum punctatum</i> 1									□
<i>Nitophyllum versicolor</i> 1/4							□		
<i>Palmaria palmata</i>		■		■		■	■		■
<i>Phyllophora crispa</i>					■	■			■
<i>Phyllophora pseudoceranoides</i>						■	■		■
<i>Phymatolithon lenormandii</i>									■
<i>Plocamium cartilagineum</i>						■	■		■
<i>Plumaria elegans</i>							■		■
<i>Polyides rotundus</i>							■		■
<i>Polyneura bonnemaisoniae</i>						□	■		□
<i>Polysiphonia elongata</i> 4							■		■
<i>Polysiphonia elongella</i> 3/4							□		
<i>Polysiphonia fibrillosa</i> 3								□	
<i>Polysiphonia foetidissima</i>								■	
<i>Polysiphonia fucoides</i>							■	■	■
<i>Polysiphonia lanosa</i> 1						□	□		
<i>Polysiphonia nigra</i>							■		■
<i>Polysiphonia spiralis</i>								■	
<i>Polysiphonia stricta</i>							■	■	■
<i>Porphyra leucosticta</i>									■
<i>Porphyra linearis</i>						■			■
<i>Porphyra purpurea</i>						■	■		■
<i>Porphyra umbilicalis</i>									■
<i>Ptilothamnion pluma</i> 4							□		
<i>Rhodomela confervoides</i>						■	■		■
<i>Rhodophyllis divaricata</i> 1/4							■		
<i>Rhodymenia nicaeensis</i>							■		■
<i>Rhodymenia pseudopalmata</i>						■	■		■
<i>Rhodochorton purpureum</i>						■	■	■	■
<i>Rhodothamniella floridula</i>							■		■
<i>Scinaia forcellata</i> 4							■		
<i>Spermothamnion repens</i> 4						■	■		
Total 89 (out of 341 for the British Isles)	1	2	0	1	2	31	54	14	54
Drift/doubtful spp.						5	15	1	5
Cumulative totals (incl. drift spp)	1	2	2	2	4	39	74	80	89

Records from:	1550	1600	1650	1700	1750	1800	1850	1900	1950
<b>Phaeophyta species:</b>									
<i>Acinetospora crinita</i>									■
<i>Arthrocladia villosa</i>	1						□		
<i>Ascophyllum nodosum</i>	1					□	□		
<i>Asperococcus fistulosus</i>	4					■			
<i>Chorda filum</i>	4					■	■		
<i>Chordaria flagelliformis</i>	1					□			
<i>Cladostephus spongiosus</i>						■	■		■
<i>Composonema saxicolum</i>									■
<i>Cutleria multifida</i>							□		■
<i>Cystoseira baccata</i>	1						□		□
<i>Cystoseira foeniculacea</i>	1					□	□		
<i>Desmarestia aculeata</i>	1						□		□
<i>Desmarestia ligulata</i>	1						□		
<i>Desmarestia viridis</i>							■		■
<i>Dictyota dichotoma</i>						■	■	■	■
<i>Ectocarpus fasciculatus</i>							■		■
<i>Ectocarpus siliculosus</i>							■		■
<i>Elachista flaccida</i>	1								□
<i>Elachista fucicola</i>									■
<i>Feldmannia globifera</i>									■
<i>Feldmannia irregularis</i>								■	
<i>Fucus ceranoides</i>	2					□	□		
<i>Fucus serratus</i>		■	=	=	=	■	■	■	■
<i>Fucus spiralis</i>						■		■	■
<i>Fucus vesiculosus</i>		■	■	■		■	■	■	■
<i>Halidrys siliquosa</i>		■			■		■	■	■
<i>Hecatonema terminale</i>									■
<i>Himantalia elongata</i>	1					□	□		□
<b><i>Hinckia granulosa</i></b>							■		■
<i>Hinckia ovata</i>									■
<i>Hinckia secunda</i>									■
<i>Hinckia sandriana</i>									■
<i>Isthmoplea sphaerophora</i>							■	■	■
<i>Kuetzingiella holmesii</i>	5							■	
<i>Laminaria digitata</i>		■	=	=		■	■		■
<i>Laminaria saccharina</i>		■	=	=		■	■		■
<i>Leathesia difformis</i>									■
<i>Microspongium gelatinosum</i>									■
<i>Mikrosyphar polysiphoniae</i>								■	
<i>Mikrosyphar porphyrae</i>									■
<i>Myriactula clandestina</i>									■
<i>Myrionema corunnae</i>									■
<i>Myrionema strangulans</i>									■
<i>Padina pavonica</i>	2					■	■	=	
<i>Pelvetia canaliculata</i>	3					□		□	
<b><i>Petalonia fascia</i></b>							■		■
<i>Petalonia filiformis</i>									■
<i>Petroderma maculiforme</i>									■
<i>Phycocelis foecunda</i>									■
<i>Pleurocladia lacustris</i>								■	■
<i>Pseudolithoderma extensum</i>									■
<i>Punctaria latifolia</i>									■
<i>Pylaiella littoralis</i>							■	■	■
<i>Ralfsia verrucosa</i>								■	■

Records from:	1550	1600	1650	1700	1750	1800	1850	1900	1950
<b>Phaeophyta species:</b>									
<i>Saccorhiza polyschides</i>	1						□		
<i>Sargassum bacciferum</i>	1						□		
<i>Sargassum muticum</i>	6	o	o	o	o	o	o	o	■
<i>Scytosiphon lomentarius</i>							■		■
<i>Sphacelaria cirrosa</i>	4						■		
<i>Sphacelaria nana</i>									■
<i>Sphacelaria plumigera</i>	4						■		□
<i>Sphacelaria plumosa</i>	4						■		
<i>Sphacelaria radicans</i>									■
<i>Spongonema tomentosum</i>							■	■	■
<i>Sporochnus pedunculatus</i>									■
<i>Stictyosiphon soriferus</i>									■
<i>Stragularia clavata</i>									■
<i>Stypocaulon scoparium</i>	■	=	■	=	=	■	■	=	■
<i>Taonia atomaria</i>									■
<i>Ulonema rhizophorum</i>									■
<i>Waerniella lucifuga</i>									■
Total 71 (out of 200 for B.I.)	2	5	2	0	1	17	33	15	54
Drift species						11	11	1	5
Cumulative totals (incl. Drift species)	2	5	6	6	6	17	37	42	71

Records from:	1550	1600	1650	1700	1750	1800	1850	1900	1950
<b>Other algae:</b>									
<i>Apistonema carterae</i>							■	■	■
<i>Chrysonema littorale</i>								■	■
<i>Chrysotila lamellosa</i>								■	■
<i>Chrysotila stipitata</i>								■	
<i>Prasinocladus marinus</i>								■	
<i>Ruttnera littoralis</i>								■	
<i>Ruttnera maritima</i>								■	
<i>Thallochrysis littoralis</i>								■	

1 = Drift

2 = Misidentified

3 = Uncertain

4 = Not found recently

5 = Recent locally extinction

6 = Recent local invader

= = Repeated record

\* = Specimens require re-determination

■ = Valid record

□ = Drift/doubtful record





Plate 1A *Calliblepharis ciliata*,  
Sloane Herbarium (BM),  
early 18<sup>th</sup> century



Plate 1B *Halurus flosculosus*,  
Sloane Herbarium (BM),  
early 18<sup>th</sup> century

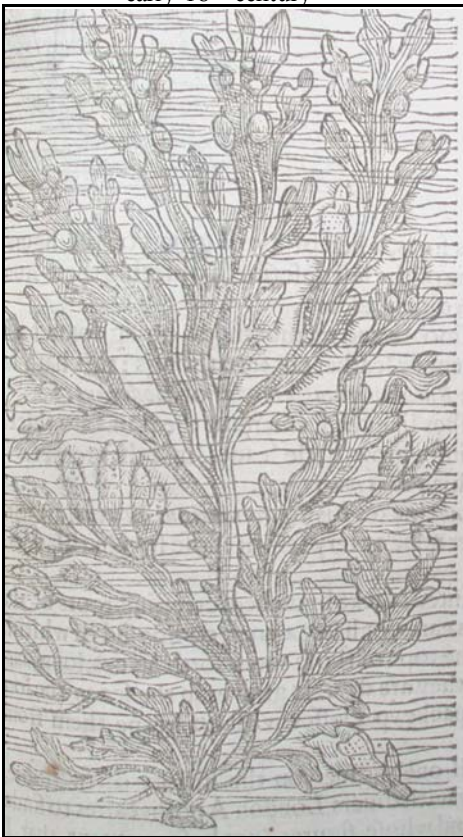


Plate 1C *Fucus vesiculosus*,  
Johnson & Gerard (1633)

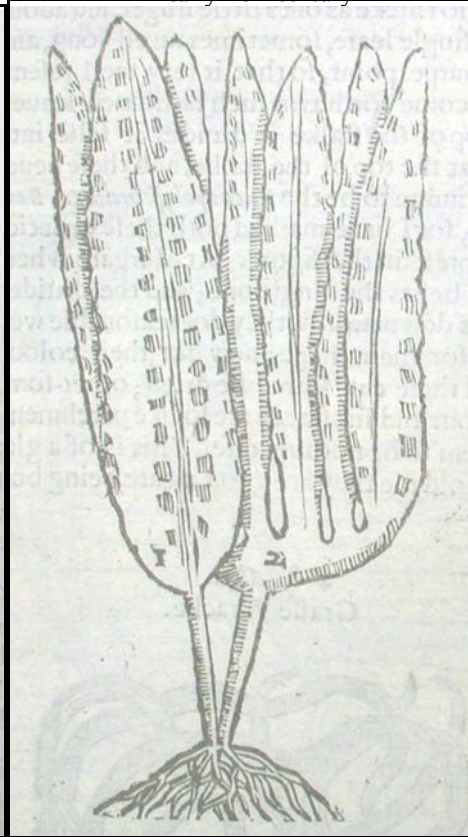


Plate 1D *Laminaria saccharina*,  
Johnson & Gerard (1633)

