

Evidence for Non-native Seaweeds in Wales



Bonnemaisonia hamifera

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Colpomenia peregrina

Seaweeds as key species in marine ecosystems

Often the dominant intertidal lifeforms, seaweeds act as primary producers, forming habitats and physically shaping the shore. They are environmental indicators for climate change – their distributions affected by sea temperatures and ocean acidification.

Non-native species are establishing in British waters at an increasing rate, especially in the last 50 years, due to climate change, shipping and aquaculture:

- In 1997 15 non-native seaweeds had been recorded (Eno et al., 1997)
- By 2012 42 non-native seaweeds or 6% of the flora were known (Brodie et al., 2012)

Their effects range from insignificant to highly invasive (with a detrimental effect on the environment or economy) and can fundamentally alter intertidal communities. E.g. Wireweed (*Sargassum muticum*) replaces natives such as Sea Oak (*Halidrys siliquosa*) and the invasive Wakame (*Undaria pinnatifida*) clogs marinas.



Asparagopsis armata

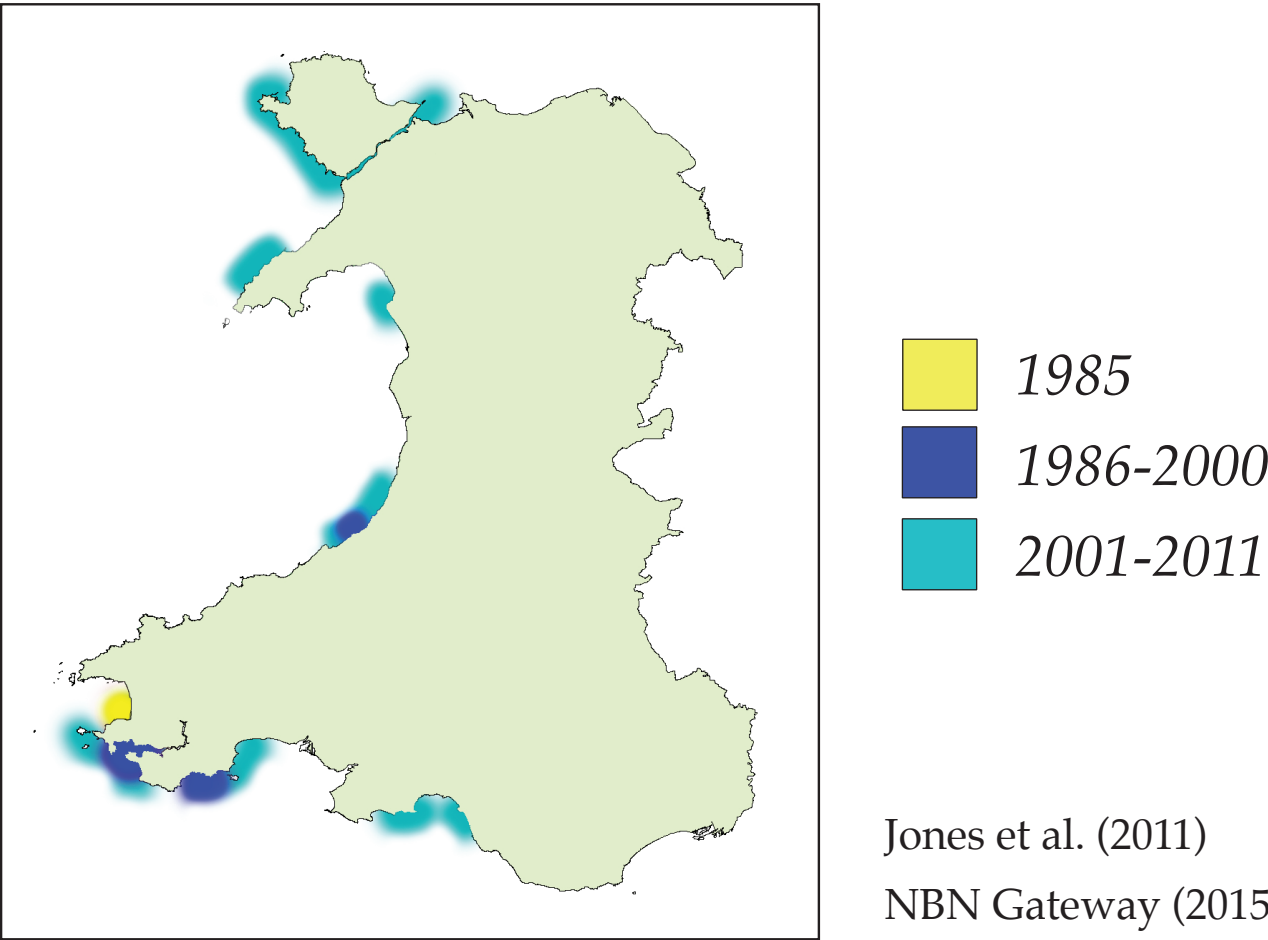
Non-native seaweeds in Wales

Wales' unique biogeographical position, where warm southern waters and cold nutrient-rich northern waters meet, makes it an excellent region to study changes in species distribution. Wales has:

- over 80% of the 650 British seaweed species
- 22 non-native seaweeds
- 8 invasive non-native seaweeds
- 3 new non-native seaweeds since 2009;

Caulacanthus okamurae, *Dasysiphonia japonica* and *Undaria pinnatifida*

Spread of *Sargassum muticum* in Wales



Jones et al. (2011)
NBN Gateway (2015)

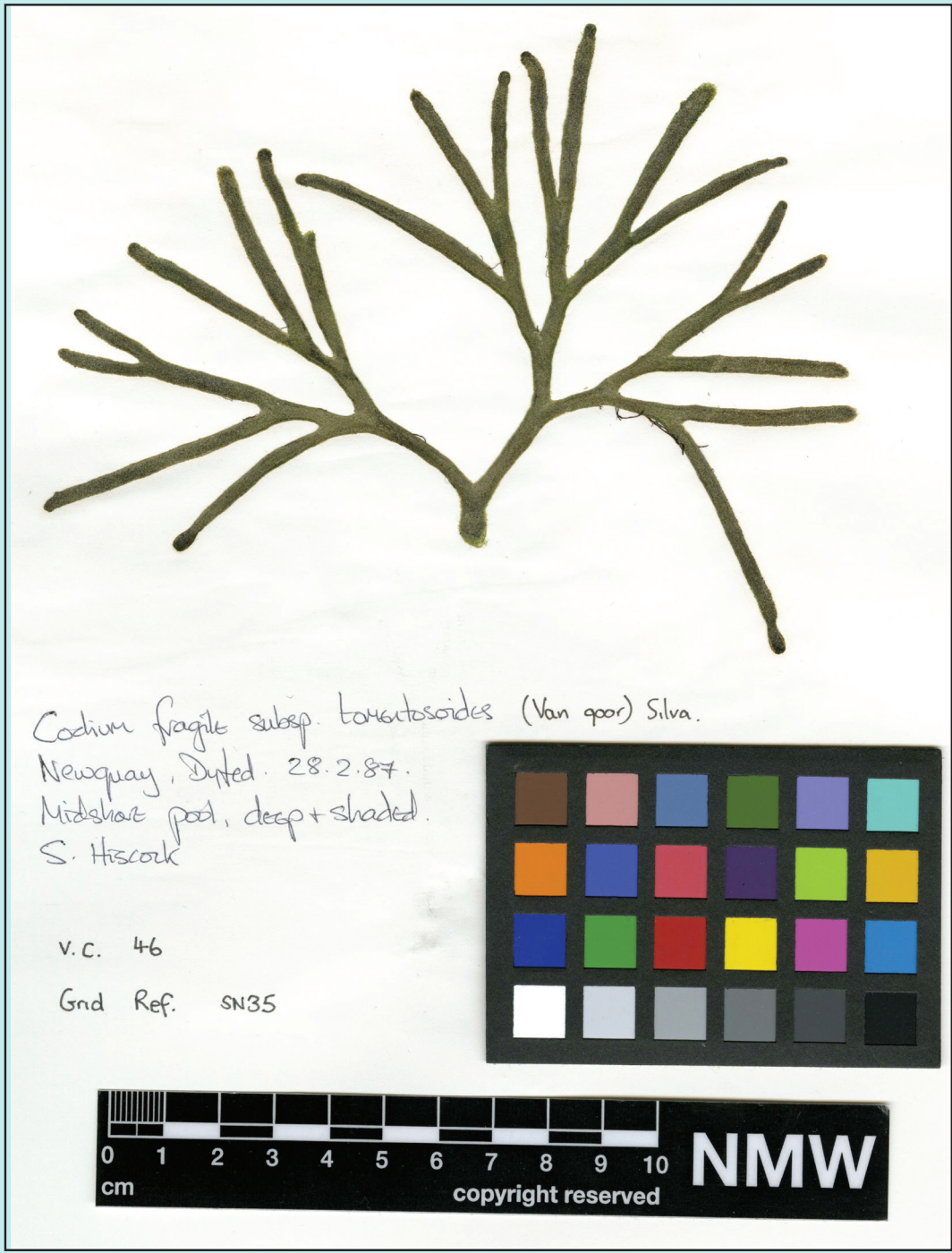


Early welsh records in Amgueddfa Cymru-National Museum Wales (NMW) revealed by the Seaweed Collections Online Project

Sargassum muticum

The commonly cited first Welsh record is Broad Haven, Pembrokeshire, 1997 (Eno et al., 1997).

JNCC (2015) reports it as drift in south Wales, 1983. This NMW specimen collected in 1985, also in Broad Haven, Pembrokeshire, backs up the earlier introduction of this invasive species into Wales.



Codium fragile subsp. *fragile* (tomentosoides strain)

This specimen collected in 1987 predates the previously known first Welsh record of 1995. However, a study of herbarium material moves the introduction date to Britain and Ireland from 1939 to 1845 (Provan, 2007). Specimens in NMW need reinvestigation to inform on its arrival and spread in Wales.

Arrival of Non-native Species in Wales

- Invasive species are shaded
- Non-native species for which further data are needed have been excluded

Group/Scientific Name	Common Name	Native Range	First record in Britain & Ireland	First Welsh Record	First Welsh Record in NMW	References
Red Algae (Rhodophyta)						
<i>Anotrichium furcellatum</i> (J.Agardh) Baldock 1976	Forked Twig Weed	Mediterranean	1976 southern England	1996 Milford Haven Waterway	-	1,2
<i>Antithamnionella spirographidis</i> (Schiffner) Wollaston 1968	-	North Pacific	1906 Plymouth	1956 Skomer	1986 Pembrokeshire	1,2
<i>Antithamnionella ternifolia</i> (C.Agardh) Nageli 1847	-	Southern Hemisphere	1926 Devon	1956 Pembrokeshire	2011 Pembrokeshire	1,2
<i>Asparagopsis armata</i> Harvey 1855	Harpoon Weed	W.Australia	1939 Galway	1983 Skomer & Llyn	-	1, 19
<i>Bonnemaisonia hamifera</i> Hariot 1891	Bonnemaison's Hook Weed	NW Pacific	1890 southern England	1953 Holy Island, Anglesey	1964 Anglesey	1,2
<i>Caulacanthus okamurae</i> Yamada	Pom Pom Weed	NW Pacific	2004 southern England	2010 Milford Haven Waterway	-	3,4
<i>Dasysiphonia</i> (<i>Heterosiphonia</i>) <i>japonica</i> (Yendo) H.-S.Kim 2012	Siphoned Japan Weed	Pacific	1999 Milford Haven Waterway	1999 Milford Haven Waterway	-	5
<i>Grateloupia turuturu</i> Yamada 1941	Devil's Tongue Weed	Pacific	1969 Solent	1984 Milford Haven Waterway	-	1,6
<i>Neosiphonia harveyi</i> (Bailey) M.-S.Kim et al. 2001	Harvey's Siphon Weed	North Pacific	1908 Weymouth	1956 W.Pembrokeshire	-	1, 19
<i>Porphyra drachii</i> Feldmann 1981	Kelp Laver	possibly the Pacific	1994 Small Islands, off Pembrokeshire	1994 Small Islands, off Pembrokeshire	-	7 (probable non-native)
<i>Solieria chardalis</i> (C.Agardh) J.Agardh 1842	Solier's Red String Weed	Mediterranean	1976 Cornwall & Dorset	1978 Milford Haven Waterway	1978 Pembrokeshire	2, 8, 9
Brown Algae (Phaeophyceae)						
<i>Colpomenia peregrina</i> (Sauvageau) Hamel 1927	Oyster Thief	Pacific	1907 southern England	1953 Holy Island	1954 Anglesey	2, 10
<i>Sargassum muticum</i> (Yendo) Fensholt 1955	Wireweed	Japan	1971 Isle of Wight	1997 Pembrokeshire 1983 as drift	1985 Pembrokeshire	2, 11, 12
<i>Undaria pinnatifida</i> (Harvey) Suringar 1872	Wakame	NW Pacific	1994 Solent	2014 Holyhead & Milford Haven Waterway	-	13, 14
<i>Zanardinia typus</i> (Nardo) P.C.Silva 2000	Penny Weed	North Atlantic, Mediterranean	1975 southern England	after 1976 Pembrokeshire	-	15, 16
Green Algae (Chlorophyta)						
<i>Codium fragile</i> subsp. <i>fragile</i> (Suringar) Hariot 1889 tomentosoides strain	Green Sponge Fingers	Eastern Asia	1845 Donegal	1995 Llyn Peninsula	1986 Pembrokeshire	2, 17
<i>Umbraulva dangeardii</i> M.J.Wynne & G.Furnari 2014 synonym: <i>U.olivascens</i>	a Sea Lettuce	Probably the Pacific	after the 1930s (France)	2005 Milford Haven	-	18, 19 (probable non-native)

Documenting threats to marine habitats

Seaweeds are under-recorded, good quality data are urgently needed to catalogue the fast changing marine flora:

- Records with voucher specimens are verifiable evidence of species' existence in space and time,
- This helps evaluate species' native and invasive status, its taxonomy and distribution.

Herbaria therefore:

- Provide evidence for the rate of spread of non-natives and therefore on their potential invasive status,
- Help to identify long established non-natives to evaluate introduction rates and future invasive species,
- Enable checking of identifications of cryptic species,
- Hold voucher specimens & DNA to support molecular taxonomy studies.

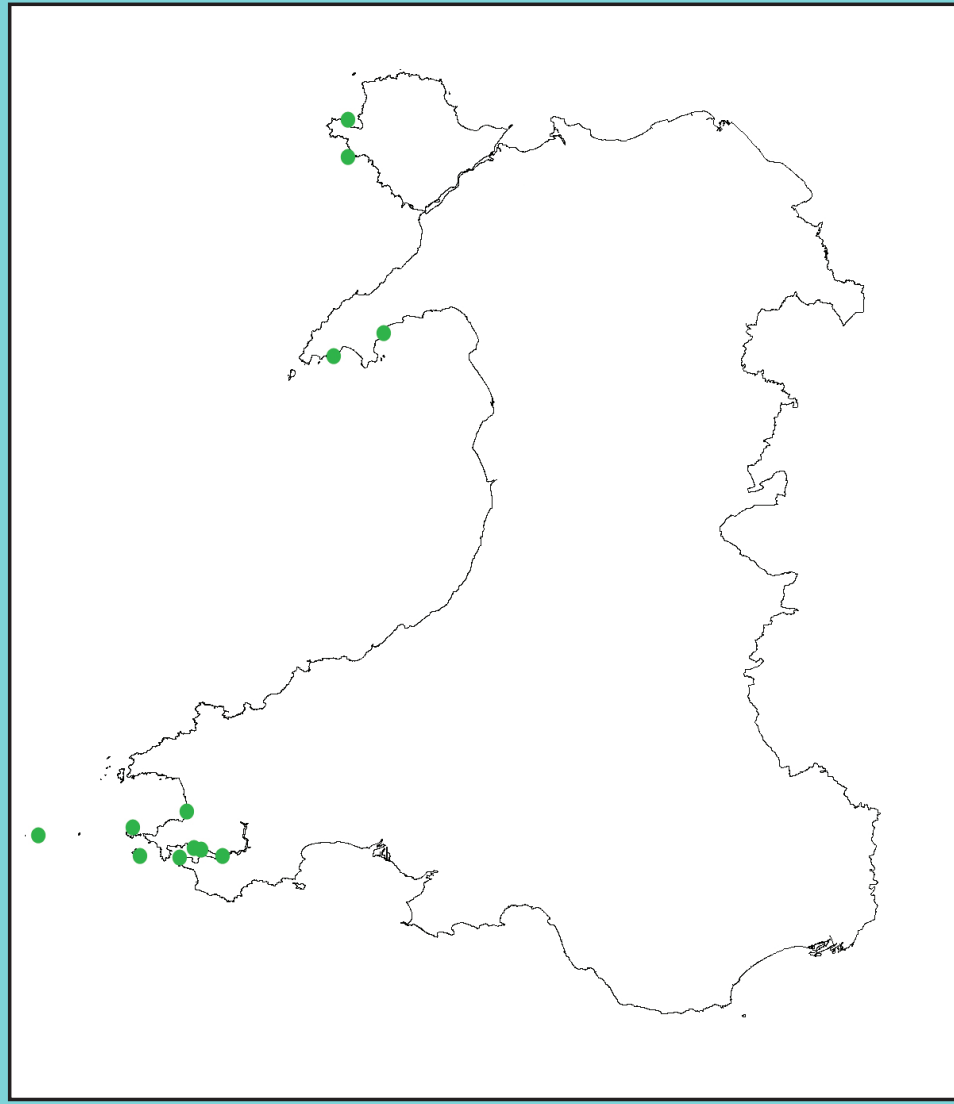
E.g. *Kallymenia crouaniorum* was described in 2014 from the NE Atlantic. Its native status was confirmed on re-examination of European herbaria material from 1894 (Robuchon et al., 2014).

References

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- (13) Fletcher & Manfredi (1995) *Bot.Mar.* 38: 355-358
- (14) Wood et al. (2015) *Comprehensive Reassessment of Non-native Species in Welsh marinas report*
- (15) Hiscock & Maggs (1982) *Ir.Nat.J.* 20: 414-416
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- (17) Provan et al. (2007) *Divers.Distrib.* 14: 343-354
- (18) Brodie et al. (2007) *Green Seaweeds of Britain and Ireland*

Sites of first Welsh records for non-native species.

Holyhead Marina, Anglesey and the Milford Haven Waterway, Pembrokeshire are introduction hotspots and reservoirs for non-natives due to shipping and aquaculture (Wood, 2015).



Help fill the gaps in the NMW collection

If you are interested in contributing records and depositing voucher specimens, especially Welsh and non-native species,

please contact
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References

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