

# Bryozoan Diversity in Scotland

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# Introduction

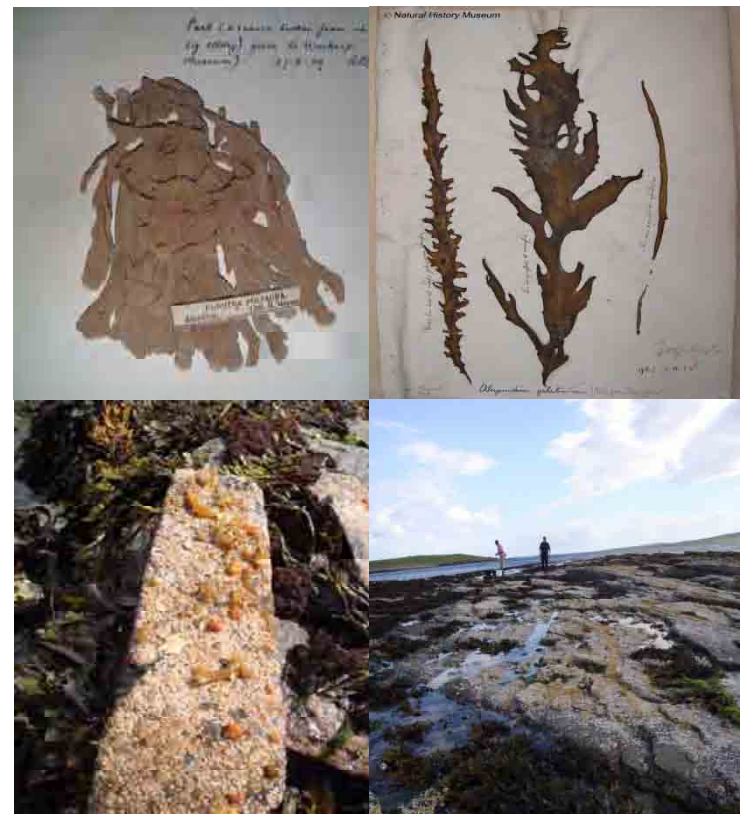
- An estimated **300 species** of Bryozoa occur throughout the British Isles, yet number of these that occur in Scotland is uncertain.
- Diversity is known to be influenced by **depth** and **substrate availability/variation**
- The bryozoan collection held at the Natural History Museum, London contains many samples collected from Scotland over the last four centuries.
- The Marine Nature Conservation Review, conducted in the UK from 1987-1998, recorded the abundance of bryozoans over an extensive area of Scotland.
- These records together with other smaller collections provide a **vast dataset** on Scottish bryozoans, offering great potential for **assessing spatial and temporal patterns in diversity**.

# Aims

1. To identify localities in Scotland where bryozoans occur and to investigate the relationship between the **distribution** and **physical** and **biological** characteristics of the area
2. To identify areas within Scotland where **sampling** has so far been **limited**
3. To establish if **distinct community assemblages** of bryozoans occur in Scotland or Scottish sub regions
4. To establish the average taxonomic distinctness as an index of **bryozoan biodiversity** in Scotland and Scottish sub-regions
5. To compare the biodiversity of sub-regions within Scotland, and to identify any **patterns in diversity** through **space** and **time**

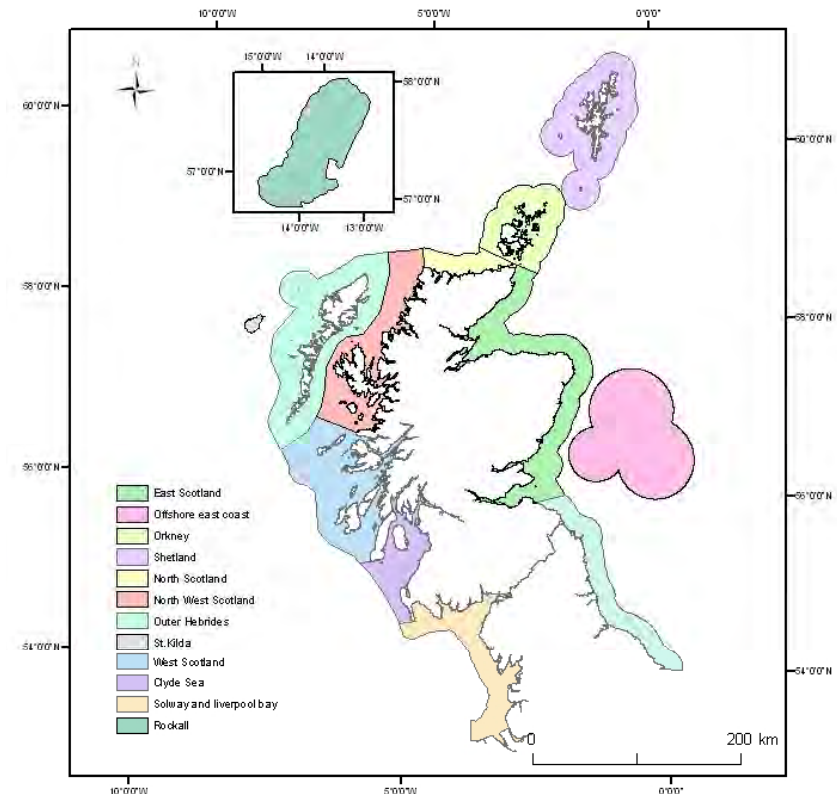
# Methods

- Records of bryozoans in Scotland were sourced from the **NHM** collection, the **NBN** gateway (including data from JNCC, SEPA, and MarLIN), **selected literature** and a **field survey** conducted in Orkney.
- A system of **rating the quality** of the data was devised to ensure that only high quality records were included in the analysis.



# Methods

- Records were mapped to show the **distribution** of bryozoans in Scotland. The distribution layer was used with environmental data layers on **energy, substrate, depth zone** and **habitat**
- Community assemblages were identified using multidimensional scale **ordination** and then mapped
- The **biodiversity** (average taxonomic distinctness) was calculated for bryozoan sampling sites and Scottish/Orkney sub-regions

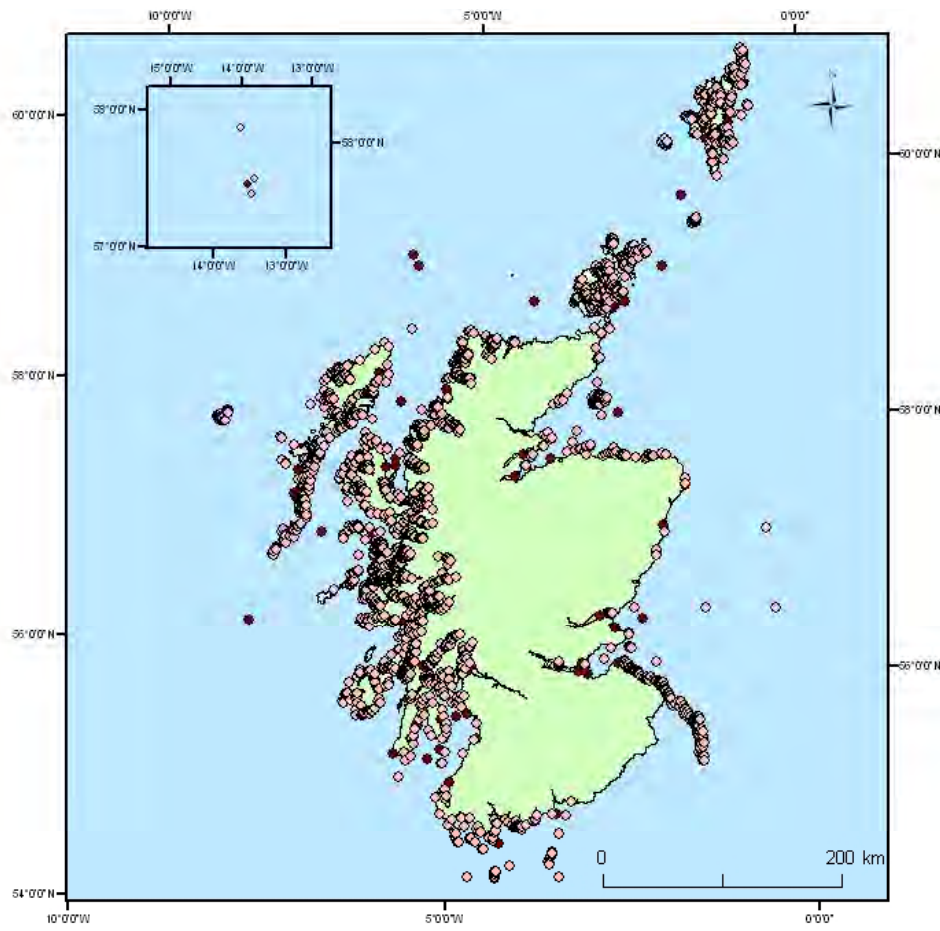


# Results

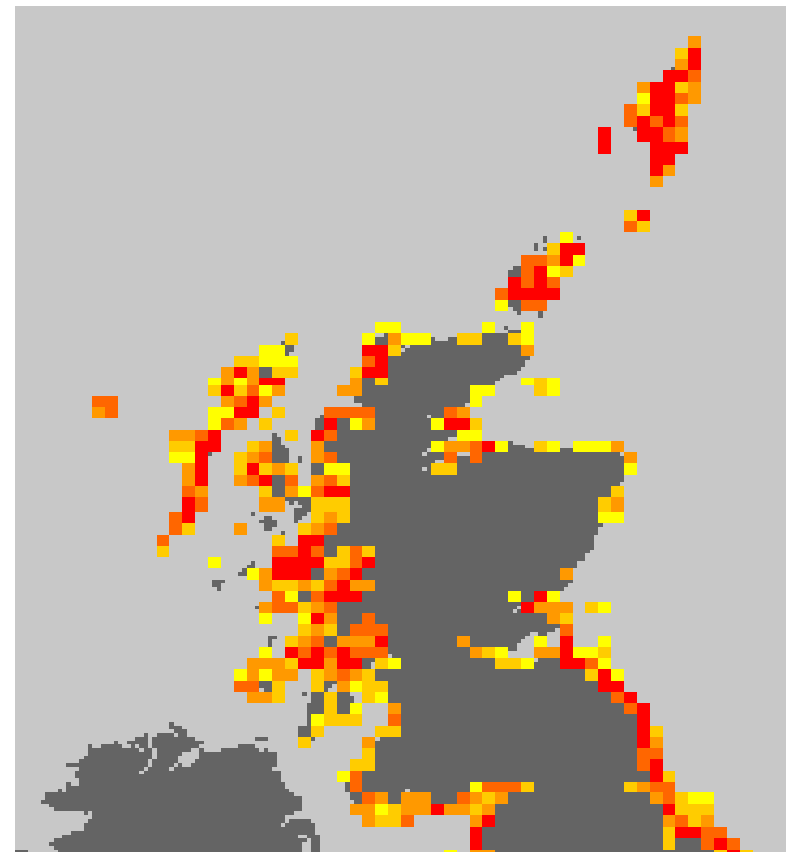
- From a total of 17 371 records, **219 species** at 3139 localities in Scotland were identified.
- The earliest specimens from Scotland were *Carbasea carbasea*, *Flustrellidra hispida* and *Vesicularia spinosa*, collected in **1792** from Leith, by Brown.
- The most commonly occurring species in the Scottish region is ***Membranipora membranacea***, which was recorded at 1266 out of 3673 localities.

# Results

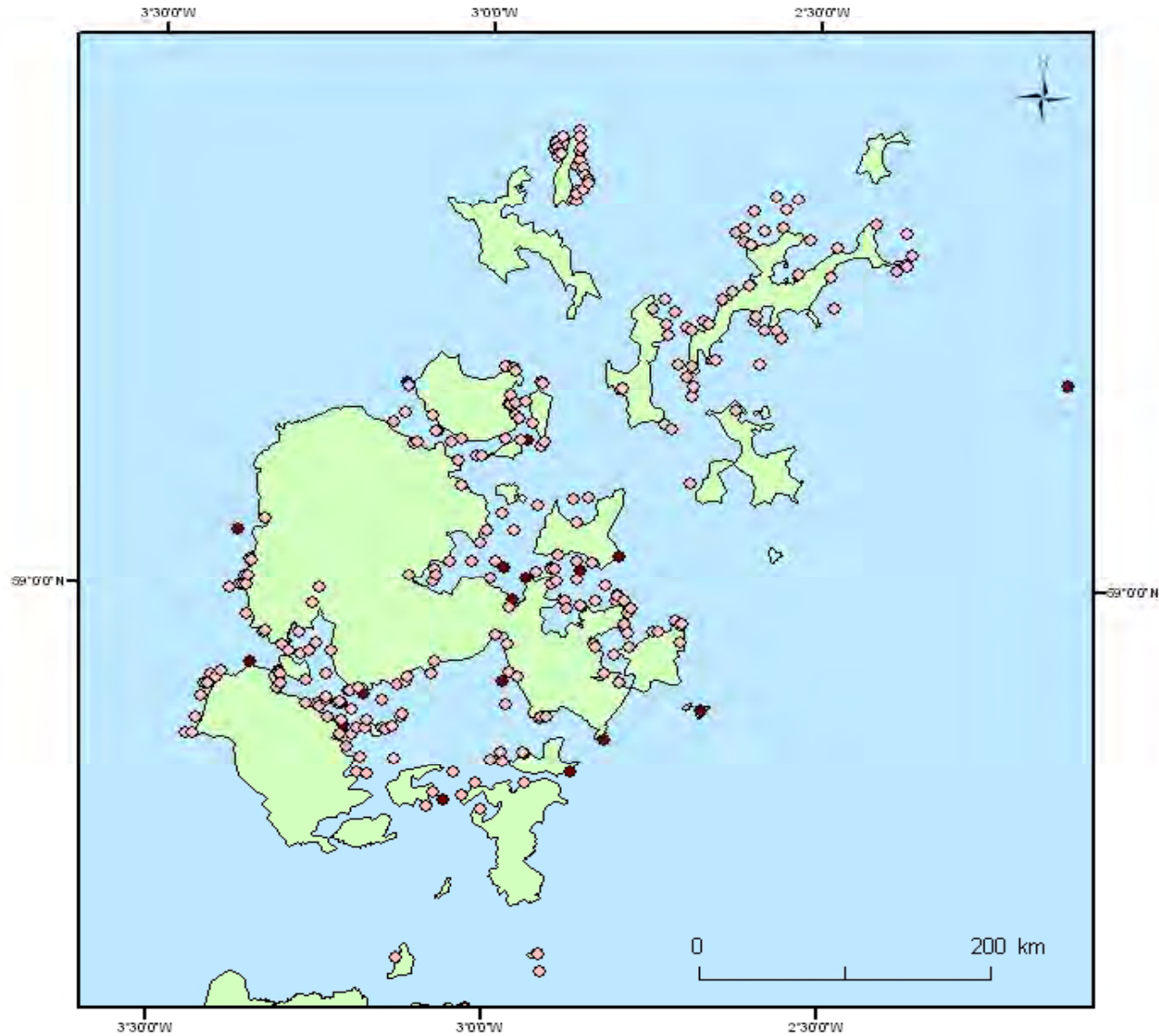
## Distribution of Bryozoans



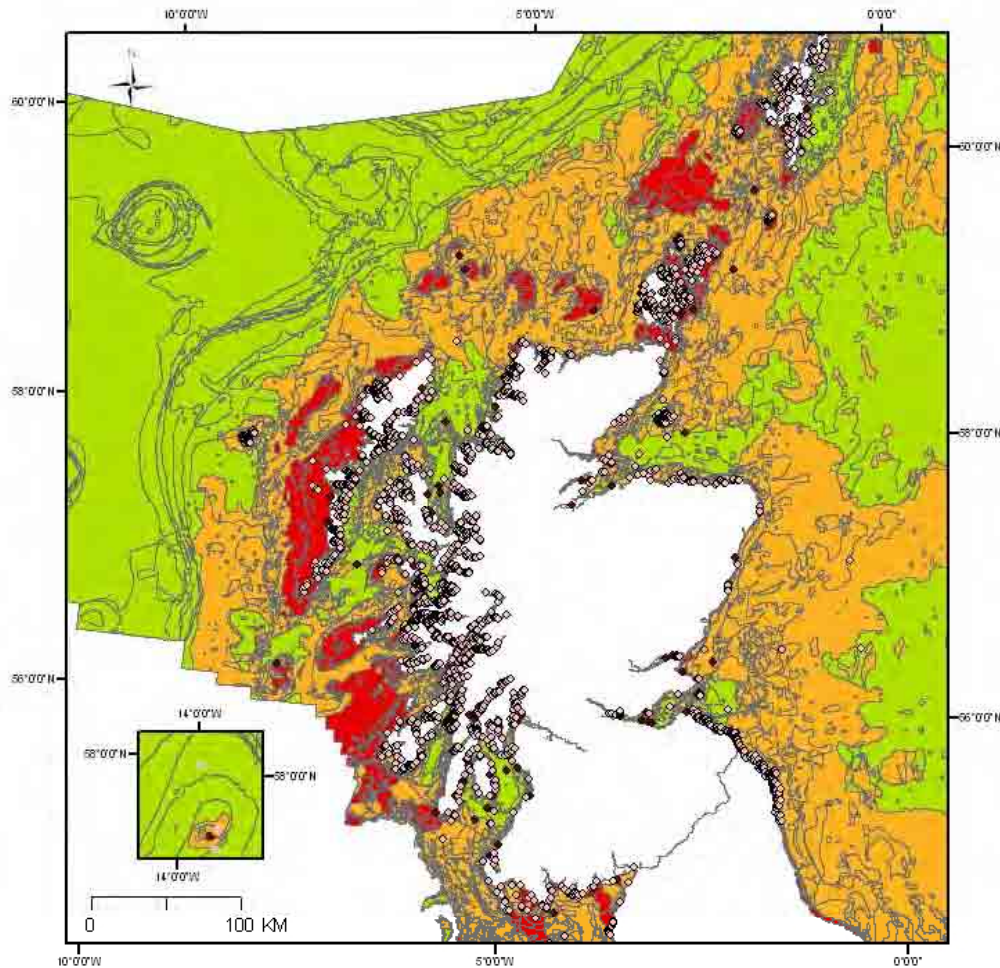
## MNCR Sampling Sites



# Distribution of Bryozoans in Orkney

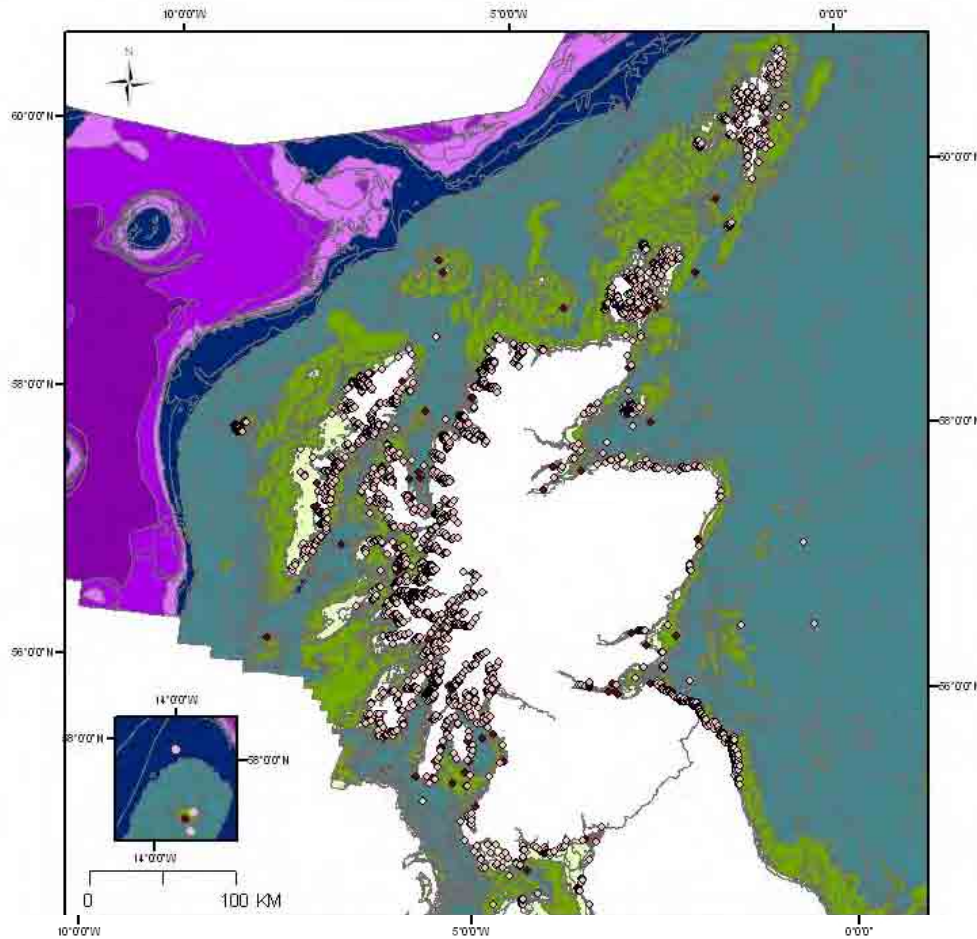


# Results



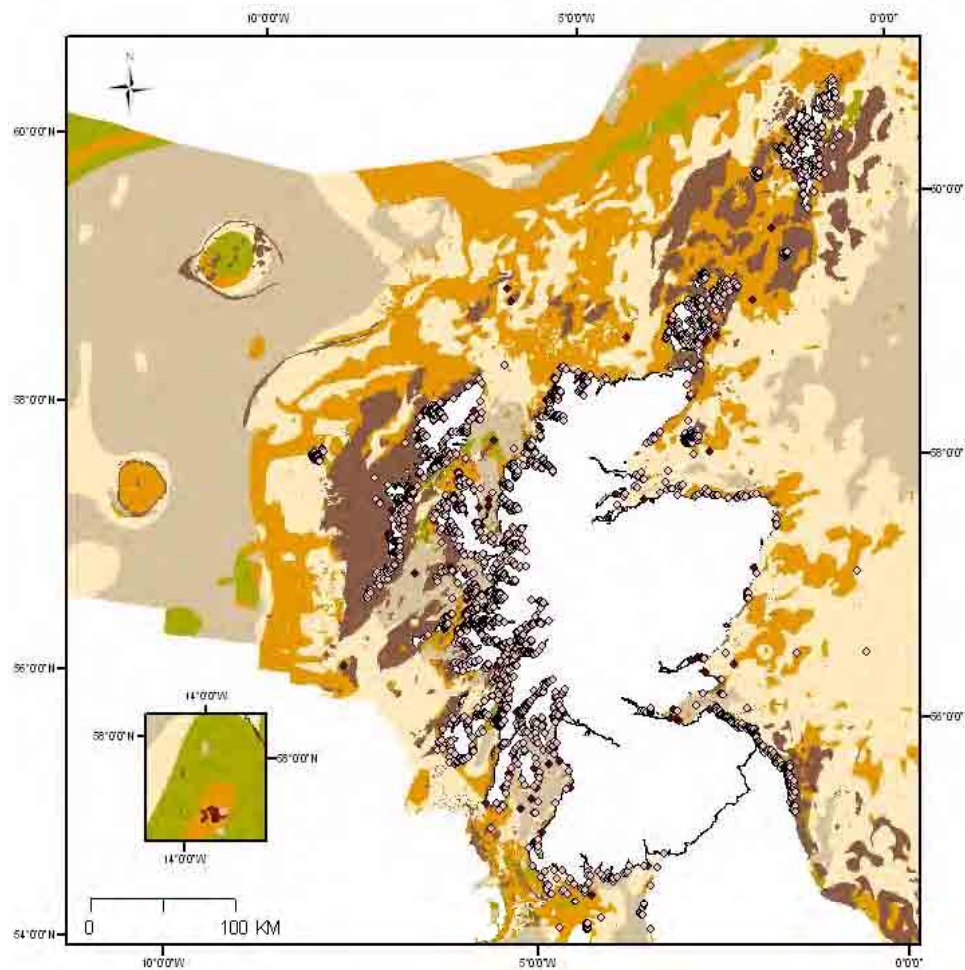
ENERGY ZONE	NO. OF SPECIES	BIODIVERSITY
High	173	62.44
Medium	122	63.83
Low	139	64.19

# Results



DEPTH ZONE	NO. OF SPECIES	BIODIVERSITY
Infralittoral	191	62.60
Circalittoral	98	63.11
Deep Circalittoral	74	65.90

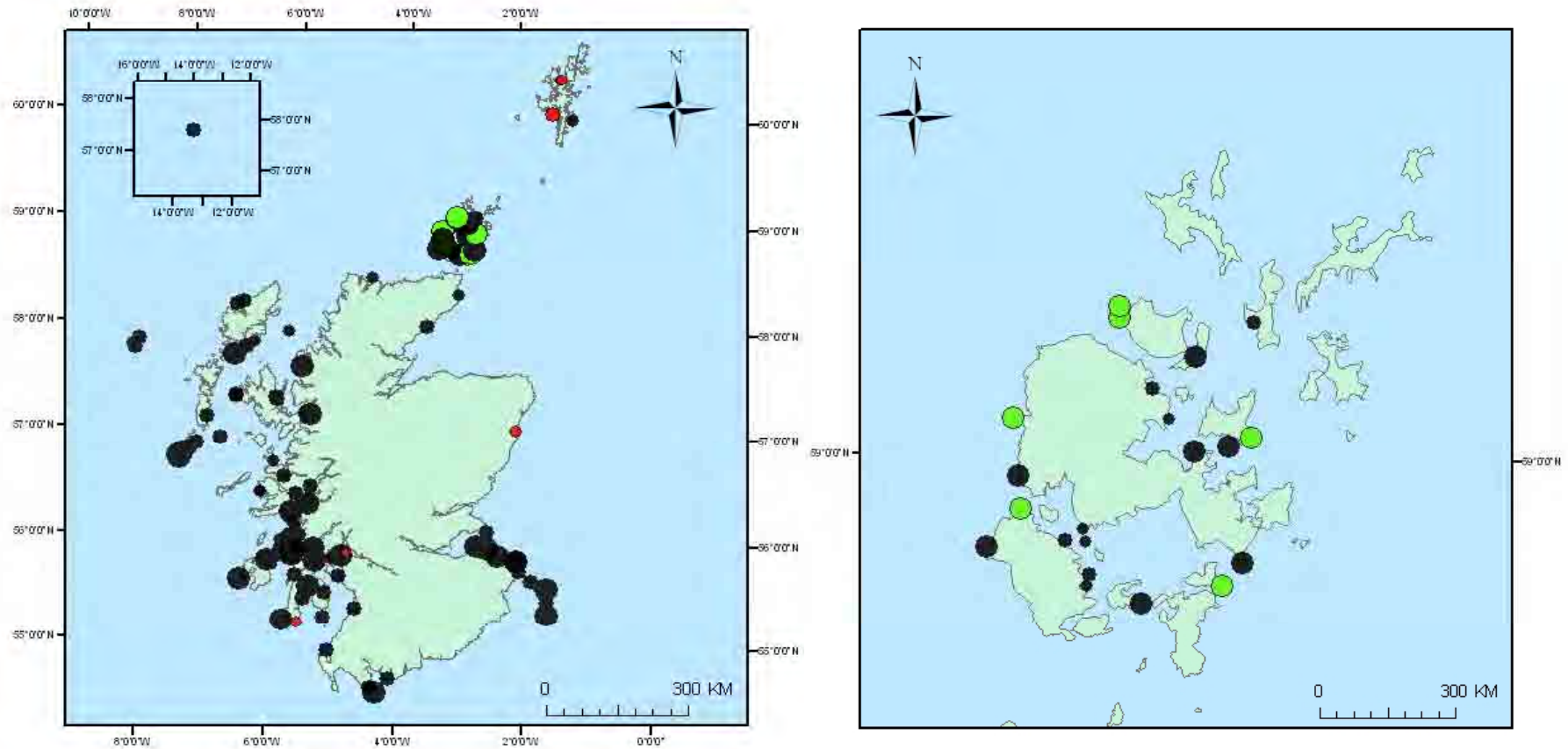
# Results



SUBSTRATE TYPE	NO. OF SPECIES	BIODIVERSITY
Rock	193	64.19
Coarse Sediment	76	63.83
Mixed Sediment	89	62.44
Sands and Muds	-	-

# Results

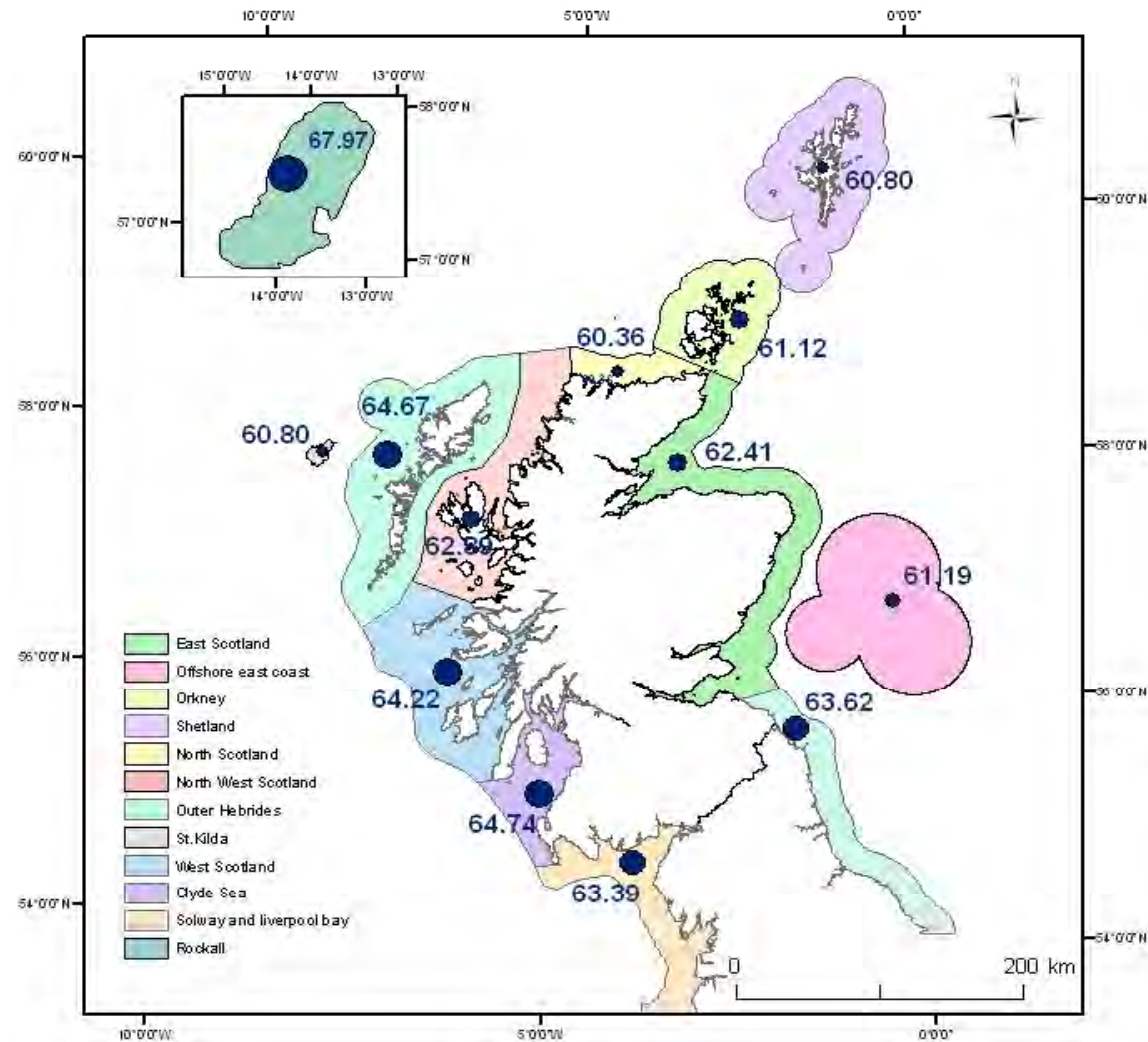
## Bryozoan Diversity in Scotland



Green sites show where the diversity is higher than the theoretically expected diversity.  
Red sites show where the diversity is lower than expected

# Results

## Diversity of Scottish Sub-Regions



# Conclusion

- The distribution and diversity of bryozoans varies across the Scottish region.
- Broad-scale habitat data suggest that spatial patterns may be a result of a number of ecological factors.
- Sampling must be prioritised to the northern and eastern coast which have previously been neglected.
- Temporal patterns remain inconclusive and require the inclusion of a greater amount of historical data for a more reliable picture of past faunal conditions

# Outputs

- Data provide an inventory of local bryozoan fauna and will serve as a **baseline** against which to detect future changes
- Despite uncertainties in some of the data layers, the study serves as a **useful demonstration of methods** which may be used to identify areas to survey, monitor and conserve for marine spatial planning.
- Such methods may also be applied to other areas of the British Isles and Ireland to understand larger-scale trend in the distribution of UK bryozoans
- Data from the project have been used to develop a British bryozoan Scratchpad website

# Outputs

The Scratchpad aims to provide the scientific community and the general public with electronic access to information and data on the Bryozoa of the British Isles and Ireland.

The screenshot displays the website interface for 'Bryozoa of the British Isles and Ireland'. The main content area is titled 'Bowerbankia imbricata (Adams 1798)'. It features a gallery of images showing the organism, a 'Taxon Description' section with 'General Description' and 'Diagnostic Description' text, and a 'Specimens map' showing the distribution of the species across the British Isles. The left sidebar contains navigation links such as 'Simple Taxonomy', 'Bryozoa', 'Content', and 'Sally Rouse'.

**Bryozoa of the British Isles and Ireland**

Home | Bryozoa | Gymnolaemata | Cladopomata | Vesicularia | Vesiculariidae | Vesiculariinae | Bowerbankia

Help | Bibliography | Contact us | Forums

Simple | Taxonomy | Go!

**Bryozoa**

- Bryozoa
- Gymnolaemata
- Cladopomata
- Vesicularia
- Vesiculariidae
- Bowerbankia
- Bowerbankia imbricata (Adams 1798)**
- clitrina
- gracilis
- gracillima
- pusillosa

Visit locations

Click to see

**Content**

- Biblio
- Biographies
- Blog entry
- Character project
- Countries map
- Forum topic
- Group
- History
- Image
- Location (DwC 1.2.1)
- Newsletter issue
- Page
- Phylogenetic tree
- Poll
- Profile
- Specimen (DwC 1.2.1)
- Taxon Description
- Taxonomy
- Webform

**Sally Rouse**

- Administer
- Groups
- My Unread
- My account
- Task guide
- Recent posts
- Feed aggregator
- Log out

**Bowerbankia imbricata (Adams 1798)**

Image

Taxon Description

**Bowerbankia imbricata (Adams 1798)**

Submitted by Sally Rouse on Sat, 10/09/2010 - 11:02

**General Description**

Colonies are often very dense and typically between 25-80 mm in length. They appear transparent, white, cream or yellowish in colour. In the creeping form, colonies closely adhere to the substrate, whereas erect colonies are raised off the substrate. The zooids form feathery or bushy clusters along a thick cylindrical stolon (up to 0.3 mm). The species is commonly found in the lower intertidal and shallow subtidal on algal or hard substrata throughout the NE Atlantic, Mediterranean and east coast USA.

**Diagnostic Description**

This species seems most nearly allied to the *Setularia cadrina* Linn Syst Nat. Ed.13 p.1313.n.28 Pallas. Zoolph. p. 139, from which however it differs in the vesicles not surrounding the stem in any regular series and in their shape. Height, from one to three inches. Young shoots closely imbricated to their base, but older ones often naked; the smaller branches, which proceed from a main stem, have the vesicles placed biserially, but their apex resume the imbricated form (Adams 1798)

**Specimens map**

Map | Hybrid | Terrain

- Developing Scratchpad further
- Skeletal mineralogy of Scottish Bryozoa (PhD studentship-Jen Loxton)
- Gene expression of Bryozoa and their responses to environmental change (Post Doctoral Project-Dr Michelle Carter)

# Acknowledgments

- Prof Jon Side and staff of ICIT for hosting our visit to Orkney in June 2010.
- Dr Helena Mansbridge (SBE) for GIS support

