Accessing and developing the required biophysical datasets and data layers for Marine Protected Areas network planning and wider marine spatial planning purposes

Report No 17: Mapping of Selected Non-Native Species (Task 2D).

Final Version

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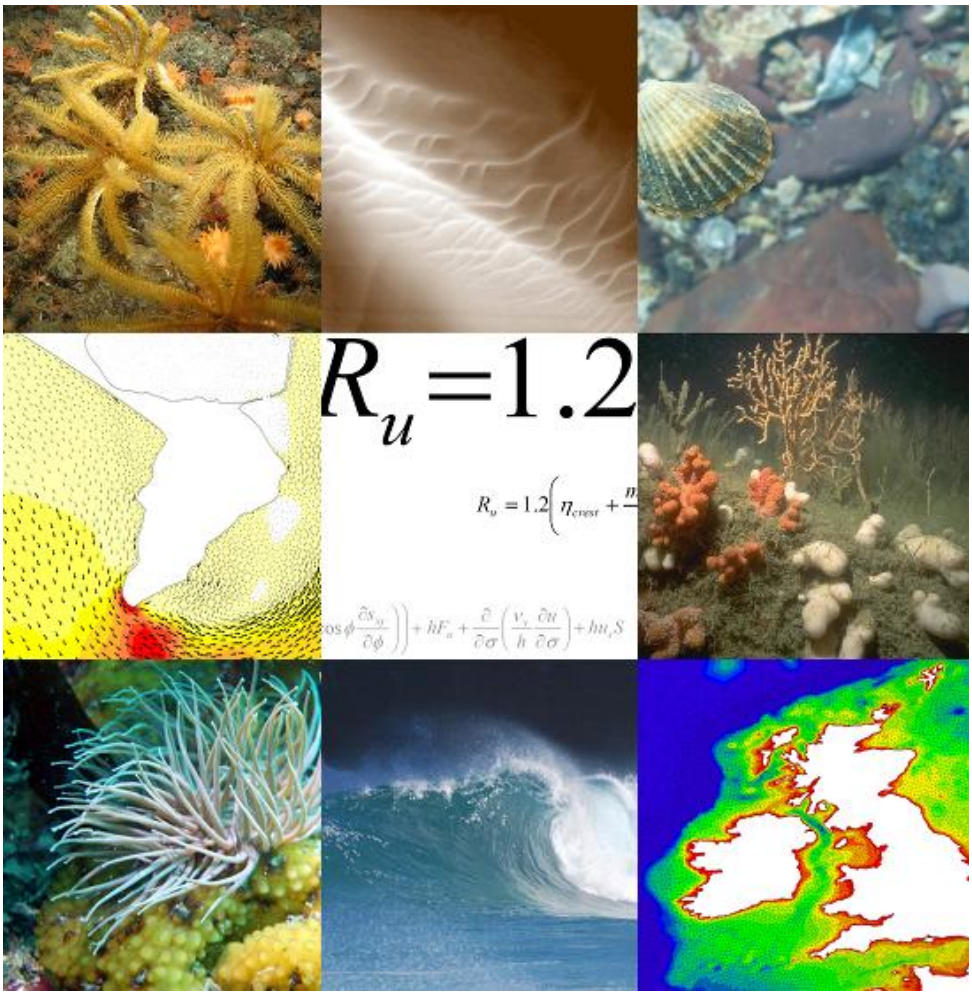

Proudman Oceanographic Laboratory
NATURAL ENVIRONMENT RESEARCH COUNCIL

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ABP mer marine environmental research

EMU

MarLIN

Cefas

Project Title: Accessing and developing the required biophysical datasets and data layers for Marine Protected Areas network planning and wider marine spatial planning purposes

Report No 17: Task 2D. Mapping of Non-Native Species

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Executive Summary

The UK is committed to the establishment of a network of Marine Protected Areas (MPAs) to help conserve marine ecosystems and marine biodiversity. MPAs can be a valuable tool to protect species and habitats and can also be used to aid implementation of the ecosystem approach to management, which aims to maintain the 'goods and services' produced by the healthy functioning of the marine ecosystem that are relied on by humans.

A consortium[1] led by ABPmer were commissioned (Contract Reference: MB0102) to develop a series of biophysical data layers to aid the selection of Marine Conservation Zones (MCZs) in England and Wales under the Marine and Coastal Access Act 2009 and the equivalent MPA measures in Scotland. Such data layers may also be of use in taking forward marine planning in UK waters. The overall aim of the project was to ensure that the best available information was used for the selection of MPAs in UK waters, and that the data layers produced were easily accessed and utilized by those with responsibility for selecting sites.

The Marine and Coastal Access Act 2009 allows for the designation of MCZs for biological, geological and geomorphological features of interest. To deliver this requirement, the project was divided into a number of discrete tasks, one of which (2D) included the production a series of data layers showing the distribution of key non-native species.

These data layers were produced by the collation of existing data from a wide range of sources and represent the largest UK-wide data collation exercise undertaken in recent years. Once collated, the data was entered into a standard structure and is displayed as ESRI Shapefiles for inclusion in standard GIS and mapping packages including ArcGIS, MapInfo and Google Earth. In addition, the spatial referencing system was standardized and the distributions clipped to the MCZ project boundaries for England and jurisdiction boundaries for Scotland, Wales and Northern Ireland. Once in the standard format the underlying data tables were quality assured to check valid information was entered in each of the attributes. Alongside the spatial data, each derived data layer has a metadata record to assist in the discovery and reuse of the outputs.

For each layer a confidence assessment was produced. The confidence assessment was based on the volume of data acquired and the information provided by experts and organizations and took account of datasets that were not available or not in a suitable format.

The species covered by this report were selected as specified in the project specification. The species include, harpoon weed *Asparagopsis armata,* a colonial sea squirt *Botrylloides violaceus, a* slipper limpet *Crepidula fornicata,* green sea fingers *Codium fragile* subspecies *tomentosoides,* Japanese skeleton shrimp (*Caprella mutica*), a sea squirt *Corella eumyota,* the Pacific oyster *Crassostrea gigas,* hard_shell clam *Mercenaria mercenaria,* a sea squirt *Perophora japonica,* a razor

[1] ABPmer, MarLIN, Cefas, EMU Limited, Proudman Oceanographic Laboratory (POL) and Bangor University.

shell *Ensis (directus*) *americanus,* the Chinese mitten crab *Eriocheir sinensis,* common cord-grass *Spartina anglica,* wireweed *Sargassum muticum,* a sea squirt *Styela clava*, and wakame *Undaria pinnatifida*.

Maps for all species were reproduced within this document as image files to allow visualization of the distribution of a representative range of species

Where possible, it has been the aspiration of the contract to make the derived data layers generated from this project freely available. Due to the range of data sources this has not always been possible. Nevertheless, all derived data will be made available to Government Departments and Public Bodies for non-commercial purposes according to the restriction of use document.

A large data collation and aggregation exercise of this kind encountered several issues. In particular, the need to harmonize disparate data formats and the negotiation with a variety of data providers to allow the widest possible release of the resulting layers. In addition, the work highlighted the importance on cataloguing and storing datasets with an appropriate level of metadata.

The report also identified future considerations to improve access to marine data, which include the need to further promote and adopt the standards and specification developed through the Marine Environmental and Data Information Network (MEDIN) programme and to ensure that organizations comply with EU legislation such as the INSPIRE Directive.

Table of Contents

Appendices

List of Tables

List of Figures

1. Introduction

1.1 Project Background

1.1 The UK is committed to the establishment of a network of Marine Protected Areas (MPAs) to help conserve marine ecosystems and marine biodiversity. MPAs can be a valuable tool to protect species and habitats and can also be used to aid implementation of the ecosystem approach to management, which aims to maintain the 'goods and services' produced by the healthy functioning of the marine ecosystem that are relied on by humans.

1.2 As a signatory of OSPAR, the UK is committed to establishing an ecologically coherent network of well managed MPAs. The UK is already in the process of completing a network consisting of Special Areas of Conservation (SACs) and Special Areas of Protection (SPAs), collectively known as Natura 2000 sites to fulfil its obligations under the EC Habitats Directive (92/43/EEC). Through provisions in the Marine and Coastal Access Act 2009, a network of Marine Conservation Zones (MCZs) can be designated in England and Welsh territorial waters and UK offshore waters. The Scottish Government is also considering equivalent Marine Protected Areas (MPAs) in Scotland. These sites are intended to help to protect areas where habitats and species are threatened, and to also protect areas of representative habitats. For further information on the purpose of MCZs and the design principles to be employed see [http://www.defra.gov.uk/marine/biodiversity/marine-bill/guidance.htm Defra, 2009].

1.3 MCZ selection will be undertaken via a participatory stakeholder engagement approach. Four Regional MCZ Projects have been established to lead this process, and have been identified as the principle 'customer' of any WebGIS system established. The Regional MCZ Projects were established during the latter half of 2009, and were expected to be fully functional by early 2010. The full stakeholder engagement process was anticipated to begin in February 2010, continuing until the end of 2011. A formal public consultation is expected in 2012.

1.4 Under the Marine and Coastal Access Act 2009, the UK government is committed to conserve, and promote the recovery of a wide range of habitats and species through the establishment of an ecologically coherent network of well managed MPAs. Five of the seven network design principles listed in the Ministerial Statement (2010)[2] cannot be fulfilled without the following knowledge:

1) Representativity – the range of marine habitats and species are represented through protecting all major habitat types and associated biological communities present in our marine area.
2) Replication – replication of major habitats through the network;
3) Viability – self-sustaining, geographically dispersed component sites of sufficient size to ensure species and habitats persistence through natural cycles of variation;

[2] Defra Ministerial Statement on the Creation of a Network of Marine Protected Areas. London: Defra, 2010.

4) Adequacy – the network is of adequate size to deliver its ecological objectives and ensure the ecological viability and integrity of populations, species and communities; and
5) Connectivity – to maximize and enhance the linkages among individual MPAs.

1.5 The selection of MPAs should be based on the best available data. This data will be a range of data types including biological, physical and oceanographic characteristics and socio-economic data (such as the location of current activities). To ensure such data are easily available to those who would have responsibility for selecting sites, Defra and its partners[3] commissioned a consortium[1] lead by ABPmer and partners to take forward a package of work. The consortium were tasked with the development of the following new Geographical Information System (GIS) data layers:

- geological and geomorphological features;
- listed habitats and species
- selected non-native species;
- fetch and wave exposure;
- marine diversity layer;
- benthic productivity; and
- residual current flow.

1.6 In addition to the development of data layers, there is a need to ensure such information can be easily accessed given the participatory nature of the MCZ process that is currently being planned. Hence, all derived data products would be made available for use by the MCZ Regional Projects and to the Devolved Administrations for their equivalent processes.

1.7 This report provides a detailed description of the development of the priority species with limited mobility data layer, the steps taken to collate the data, standardise, undertake quality assurance and output the resulting layers in an accessible format.

1.8 Relevant datasets are held by a wide variety of organizations and individuals with a regional or species-specific bias to the data. Through large collation exercises, these datasets can be standardised and made widely available for future projects, greatly reducing the time taken to collate data and improving the long-term availability and visibility of important datasets.

1.2 Aims and Objectives

1.9 The aims of this element of the project were to produce spatially referenced tables and associated GIS layers showing the distribution of non-native species.

1.10 The species covered by this report are harpoon weed (*Asparagopsis armata*), A colonial sea squirt (*Botrylloides violaceus*), a slipper limpet (*Crepidula fornicata*), green sea fingers (*Codium fragile* subspecies *tomentosoides*), Japanese skeleton shrimp (*Caprella mutica*), a sea squirt (*Corella eumyota*), Pacific oyster (*Crassostrea gigas*), hard-shell clam (*Mercenaria mercenaria*), a

[3] Joint Nature Conservation Committee (JNCC), Countryside Council for Wales (CCW), Natural England (NE), Scottish Government (SG), Department of Environment Northern Ireland (DOENI) and Isle of Man Government.

sea squirt (*Perophora japonica*), a razor shell (*Ensis (directus*) *americanus*), Chinese mitten crab (*Eriocheir sinensis*), common cordgrass (*Spartina anglica*), wireweed (*Sargassum muticum*), a sea squirt (*Styela clava*) and wakame (*Undaria pinnatifida*).

1.11 The full species list and corresponding legislation that they fall under is listed in Appendix B.

1.3 Format of the Report

1.12 The report comprises three main sections:

- Section 1 details the approach and methodology used to derive the layers;
- Section 2 shows the results and outlines guidance for use and interpretation, and
- Section 3 outlines issues encountered during data collation and layer generation production and sets out future considerations.

1.13 In addition, the Appendices provide further contextual information.

2. Adopted Approach and Methodology

2.1 Collation of Data and Information

2.1 Data was requested from all the major holders of marine biodiversity data for the target species identified in Appendix B. Additional records for the species were sought through direct contact with authors, specialists, recording schemes, societies and organisations known to have carried out work on target species, or who were likely to hold records and information on their distribution. Their details are included in Appendix B.

2.2 The data collated from the statutory agencies and major databases (such as the UKOOA holdings) and the National Biodiversity Network (NBN) were augmented by a literature search for each species on the list, utilising the resources of the National Marine Biological Library (NMBL) and other online literature search tools.

2.3 The data collation was undertaken simultaneously for Limited Mobility Benthic Species (2B), Habitats (2C), Non-native species (2D) and the Biodiversity Layer (2F). In total, over 120 individuals from 68 organizations were initially contacted of which 107 provided data to the project. The resulting number of species records was over 2 million.

2.4 Publications containing relevant information were collected and records extracted. These records (and their originating publication) were then entered into Marine Recorder where permissions allowed. Where permission was not granted for Marine Recorder upload, or there was risk of duplication, some records were imported directly into the species layers. The risk of duplication was caused by access to the latest records from organizations such as Seasearch which had not yet been entered into Marine Recorder. Entry by MarLIN would therefore result in multiple entries for the same record when MarLIN holdings were uploaded to the NBN.

2.5 In addition to requests for data for the MB0102 project, the data providers were asked to give permission for wider dissemination and archiving in DASSH, the MEDIN Data Archive Centre (DAC) for biodiversity data. Where it was agreed, the requests enabled the derived data layers to be more widely available and ensured that data became available from a central point for future projects.

2.2 Quality Assurance

2.6 Progress of datasets through Marine Recorder into the archive used for the contract was monitored using an Access database to ensure that QA standards were adhered to during data input. A record of publication and data sources used was stored in an Endnote database. The bibliography is included in this report. Details of the points of contact and specialists consulted during the data acquisition phase of the project were also logged in the same Access database. The details of individuals and organizations contacted are all available in Appendix D of this report.

2.7 After initial data entry all data and metadata were validated and verified to ensure the data met appropriate standards. The standards used included those established by the Join Nature Conservation Committee (JNCC) and

DASSH (the Archive for Marine Species and Habitat Data) in its role as a Marine Environmental Data and Information Network (MEDIN) Data Archive Centre (DAC). Data validation was carried out independently of the member of staff responsible for data entry.

2.3 Taxonomic Standards

2.8 All species records were matched to the World Register of Marine Species[4], (WoRMS) using the online "Match taxa" tool. The matching gave a consistent species list to work from and ensured that the layers included the most up-to-date taxonomic information. The matched taxonomic lists were then joined back to the original dataset. In all cases, the taxonomy originally assigned by the data provider was retained to ensure all changes were clear in the final layer.

2.4 Analysis and Data Layer Development

2.9 The species data was then imported into an ESRI Geodatabase structure and the GIS information was standardised and referenced to geographic coordinate system WGS84. The standardization involved the re-projection of any data held in different datums using the toolboxes available through the ESRI ArcGIS software. As Marine Recorder exports data in OSGB36 the Petroleum geographic transformation was applied to re-projecti the data from OSGB36 into WGS84.

2.10 The collated data was stored in an ESRI Geodatabase with standardised fields. The fields used were agreed with the Project Steering Group and are show in Table 1.

Table 1. Field names for species layers

Field Name	Description.
OrigName	Name in original dataset.
SciName	Name matched in WoRMS.
SurveyID	Unique Survey ID from Marine Recorder. Where data was not entered into Marine Recorder a unique project ID was assigned.
Date_	Date of Record.
LocName	Name of location where record is taken.
SampleID	Unique ID from Marine Recorder (where relevant).
Event	Name of Survey Event from Marine Recorder (where relevant).
Lat	Latitude of record.
Long	Longitude of record.
Determiner	The group or individual(s) responsible for the taxonomic determination.
Status	Status of the record (Present, Absent, Uncertain).
Precision	Precision of spatial information, based on how the spatial information was derived.

[4] SMEBD (2009). World Register of Marine Species. Accessed at http://www.marinespecies.org on [2009-09-15].

2.11 In addition, a survey table was produced in Microsoft Access, to record details of each survey and allow the further interrogation of the layers. The survey table was provided separately to the species layer as it would result in a large amount of duplicated information and greatly increase the size of the delivered layers. The layers can be linked through the SurveyID field which is common to both tables. The fields in the survey table are shown in Table 2.

Table 2. Field names for survey table

Field Name	Description.
SurveyID	Unique Survey ID from Marine Recorder. Where data was not entered into Marine Recorder a unique project ID was assigned.
SpeciesListUsed	The name of the species list. In all cases this was "WoRMS – World Register of Marine Species".
SurveyName	Name of the Survey
SurveyTechnique	Where know the method of survey that the records result from.
StartDate	The date the survey started. In cases where only the month or year are know the first day of the month or year are recorded.
EndDate	The date the survey ended. In cases where only the month or year are know the last day of the month or year are recorded.
SurveyTechniqueDetails	Where known further details of survey technique are recorded.
UseContraints	The limitations on the use of the data.
DeterminedBy	The group or individual(s) responsible for the taxonomic determination.
Surveyors	The group or individual(s) responsible for the survey.

2.5 Confidence Assessment

2.12 In many cases, we were aware of data that was not available within the scope of the project, or that were not in an accessible format currently. Therefore, there was a need to attach a measure of confidence to the resultant species layers. Table 3 shows the ascribed confidence based on current data availability.

Table 3. Confidence assessment, based on data availability

Species name	Confidence	Rationale
Asparagopsis armata	Medium	Not all data available
Botrylloides violaceus	High	All accessible data included.
Crepidula fornicata	Medium	Widespread sublittoral species
Codium fragile subspecies tormentosoides	Medium	Not all data available
Caprella mutica	High	All accessible data included.
Corella eumyota	High	All accessible data included.
Crassostrea gigas	High	All accessible data included.
Mercenaria mercenaria	High	All accessible data included.
Perophora japonica	High	All accessible data included.
Ensis (directus) americanus	High	All accessible data included.
Eriocheir sinensis	High	All accessible data included.
Spartina anglica	Medium	Not all data available
Sargassum muticum	High	All accessible data included.
Styela clava	High	All accessible data included.
Undaria pinnatifida	Medium	Not all data available

2.13 Once sufficient preliminary records were collected a series of draft maps were produced, displaying the currently recognized distribution for each species. These maps were then made available, with restrictions through the MarLIN website. All previous consultants, along with any known specialists not yet contacted were invited to review the distributions and provide feedback. The feedback was then collated and additions and edits made to the underlying data, Details of the additional data are shown in Appendix C.

2.14 GIS data was manually screened for duplicate entries, missing information and points plotting on land. There remains an issue with creating point layers where some historic data is stored at resolutions of 1 or 10kms. Coordinate precision was therefore included as a data attribute, to allow records at these resolutions to be filtered out as required without having to remove them from the final layers.

2.15 Where many replicates were taken at one station, or duplicates formed by more than one surveyors records being entered the points were removed. Where sampling occurred at different years (for example as part of long-term monitoring programmes) the data from the latest year was retained.

3. Derived Data Layers for Selected Non-native Species

3.1 Using the Data Layers

3.1 The interpretation and usage of the derived data layers should be carried out with reference to the information outlined in the sections below. Each layer had valid MEDIN discovery metadata associated with it, allowing further interpretation and additional information relating to the layer.

3.2 Coordinate Precision

3.2 All records are provided as points. However, this data must be interpreted using the coordinate precision field. The precision may affect how a record displays, particularly for those at 10 km resolution as they may appear offshore for an intertidal species or intertidal for a sublittoral species.

3.3 Figure 1 illustrates the precision of a typical selection of records.

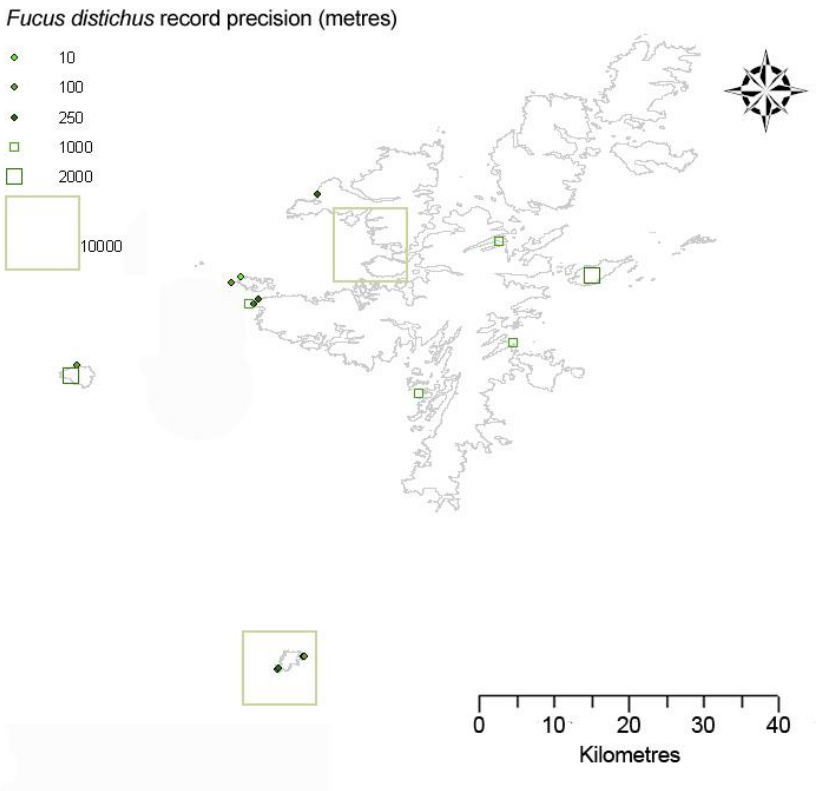

Figure 1. Example of varying coordinate precision for records within a dataset.

3.3 Permissions and Reuse

3.4 The non-native (2D) species layers are provided only for the uses set out by Defra in the Restrictions of Use document, included here as Appendix D. The original data providers should be contacted for any uses outside the 'Accessing and developing the required biophysical datasets and data layers for Marine Protected Areas network planning and wider marine spatial

planning purposes' contract remit. Where possible, permission has additionally been cleared for data to be disseminated publicly via the NBN.

3.5 The derived data layers resulting from the MB0102 project will be made available through the MEDIN DAC network, with metadata available through the MEDIN portal available from the MEDIN website[5].

3.4 Example Maps

3.6 From the resulting data layers, a series of images have been produced within this report showing the distribution of those non-native species as specified in the project specification. These demonstrate the outputs from the project GIS but do not include the GIS functionality to allow the user to zoom, pan and query the data points.

[5] http://www.oceannet.org/

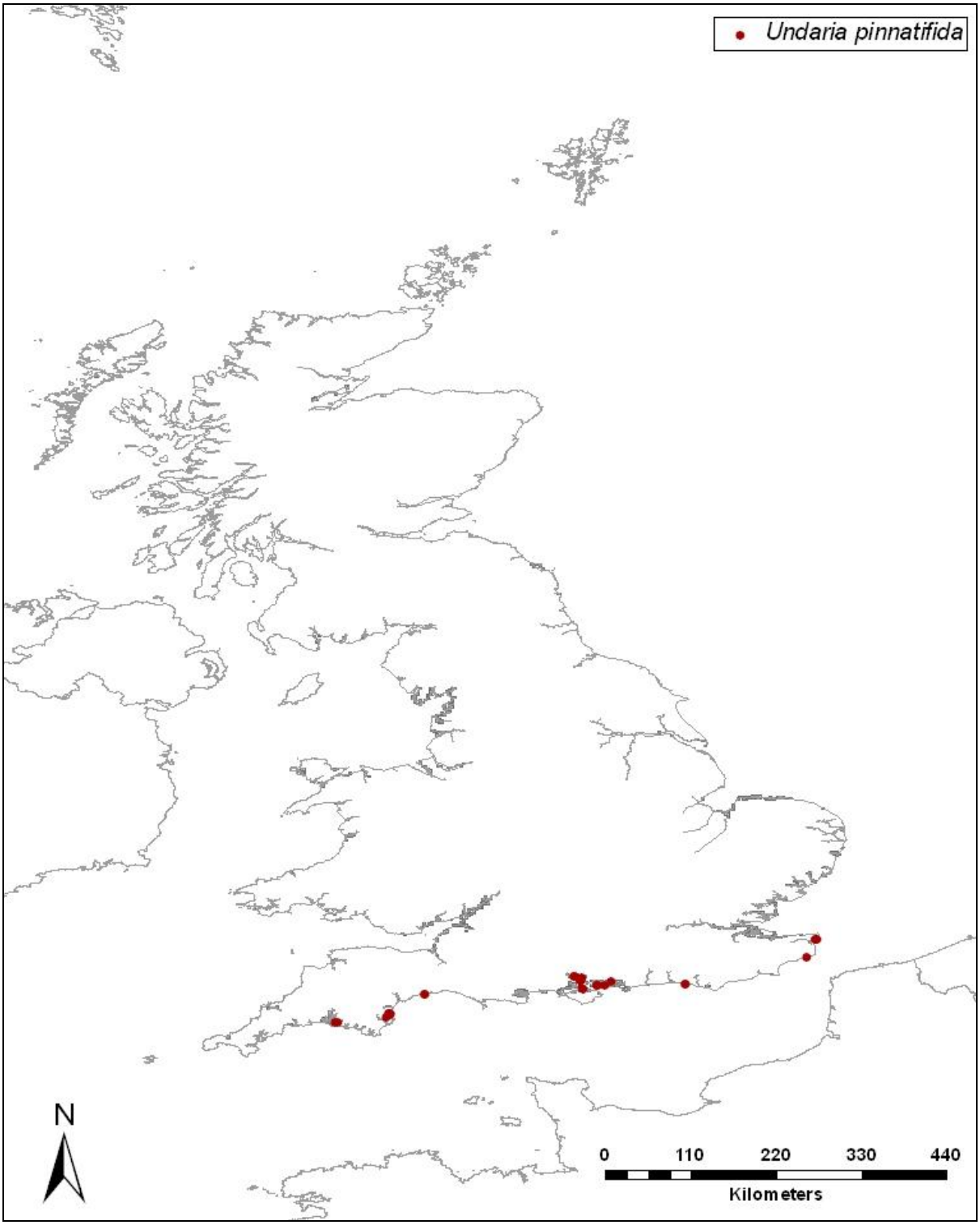

Figure 2. Final derived data layer for wakame *Undaria pinnatifida*.

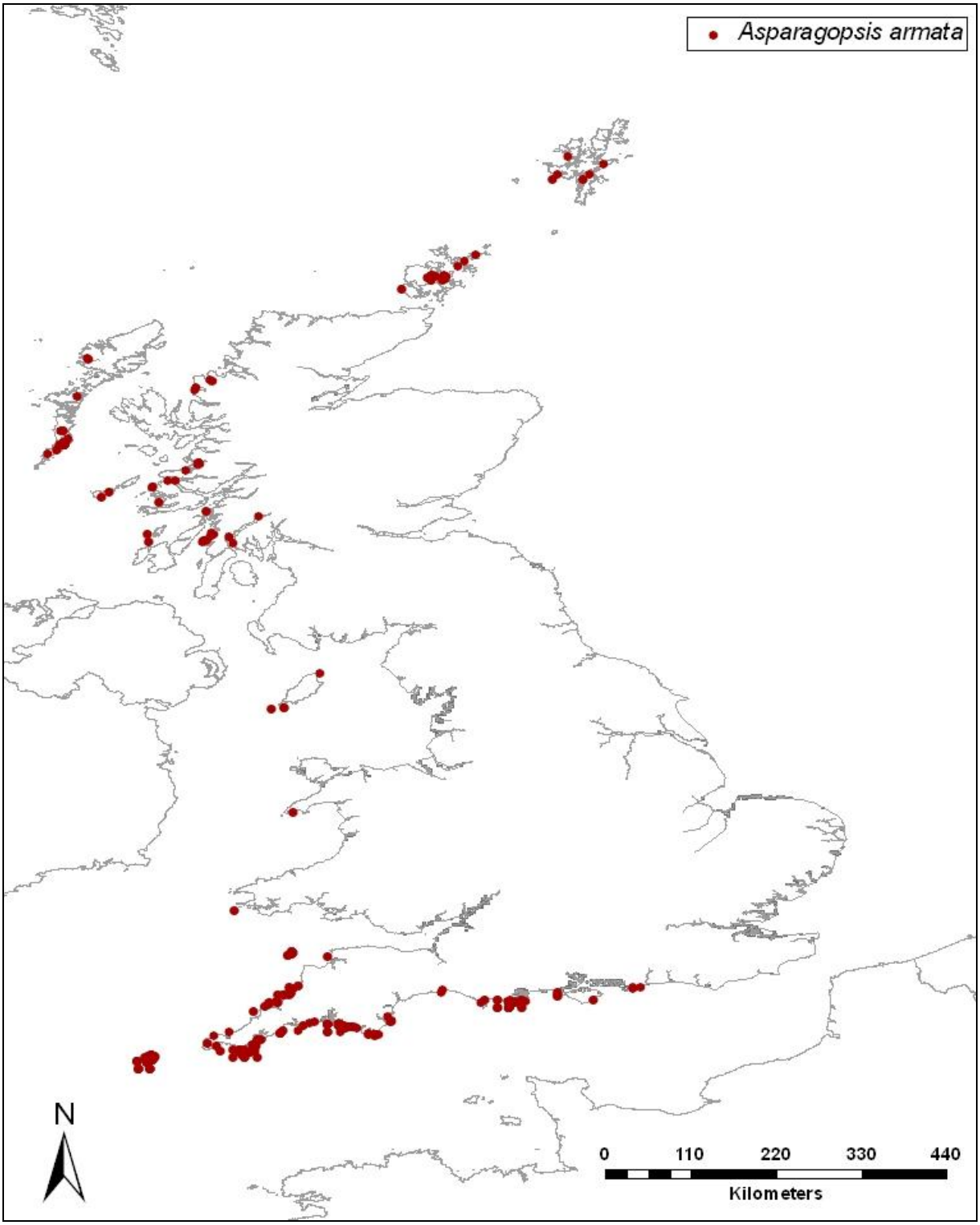

Figure 3. **Final derived data layer for harpoon weed *Asparagopsis armata*.**

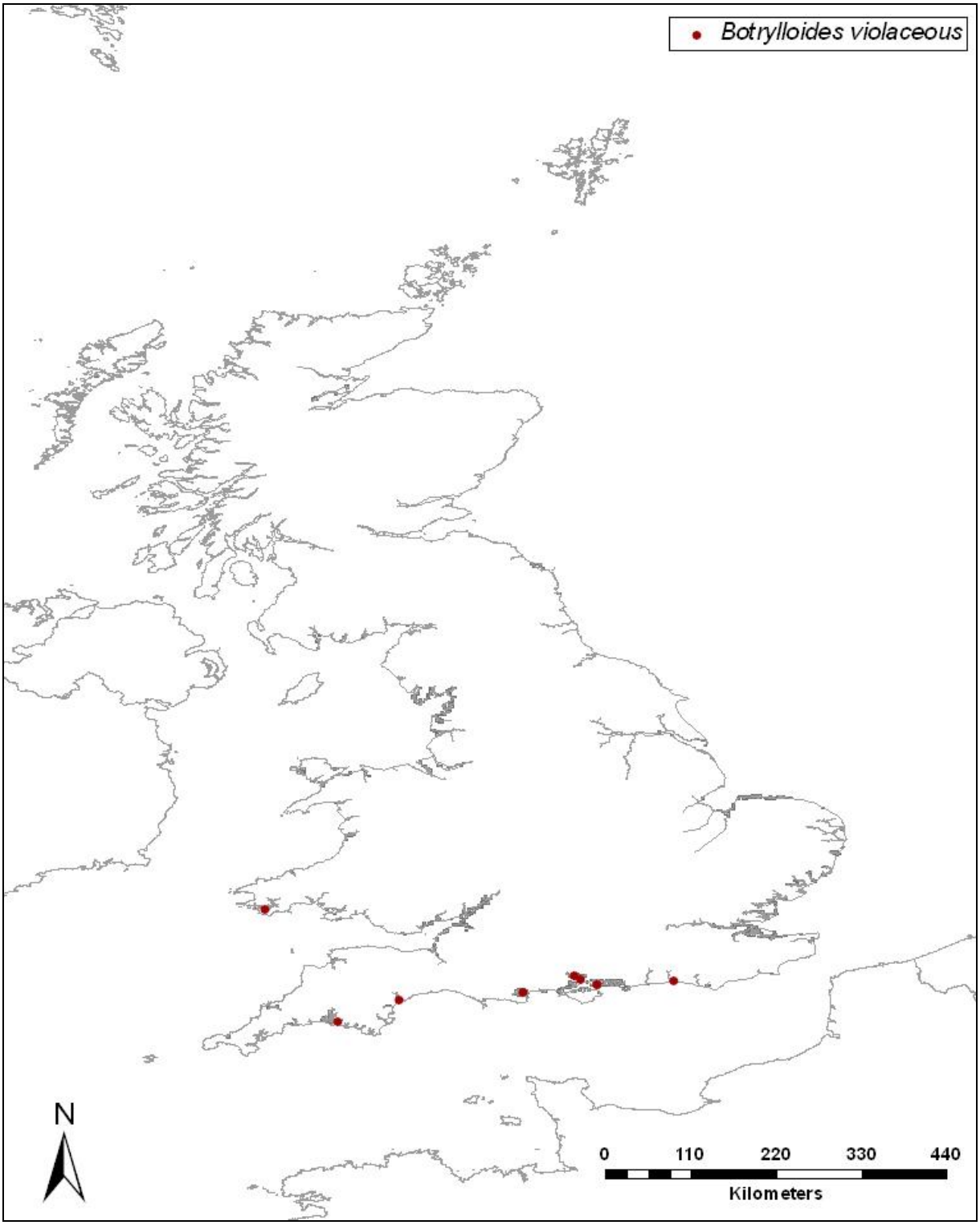

Figure 4**. Final derived data layer for the colonial sea squirt *Botrylloides violaceous*.**

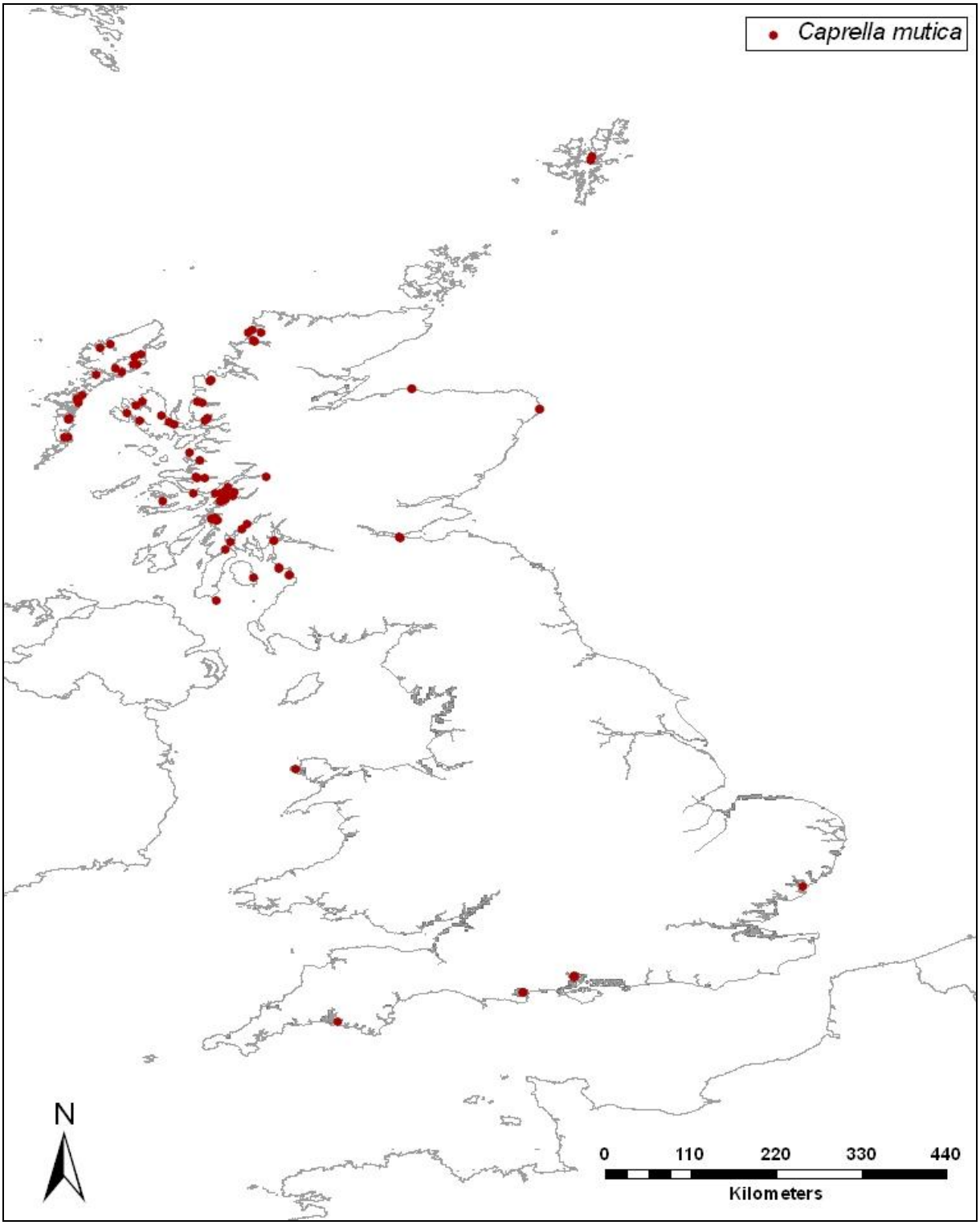

Figure 5. **Final derived data layer for the Japanese skeleton shrimp *Caprella mutica*.**

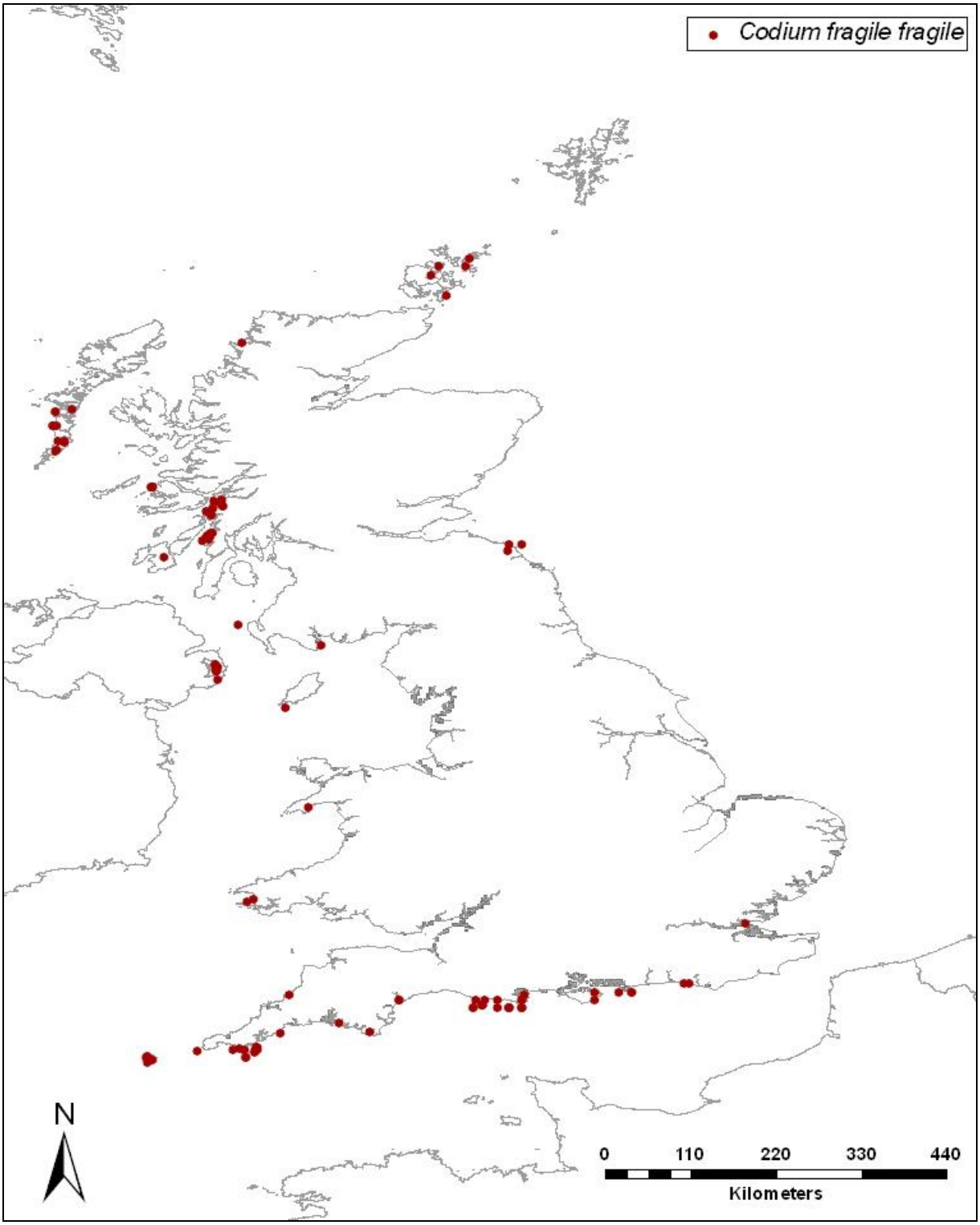

Figure 6. **Final derived data layer for green sea fingers *Codium fragile fragile*.**

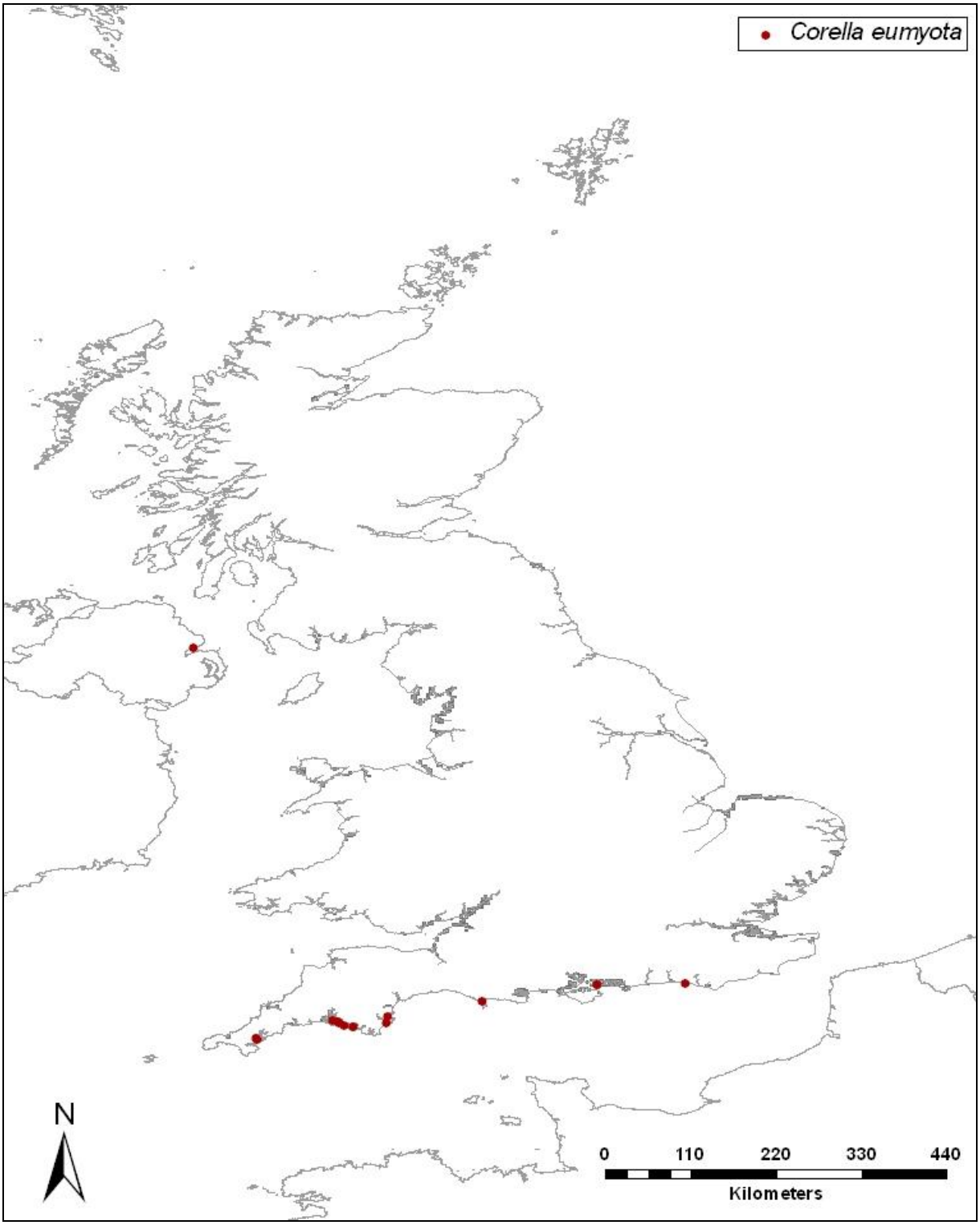

Figure 7. **Final derived data layer for the sea squirt *Corella eumyota*.**

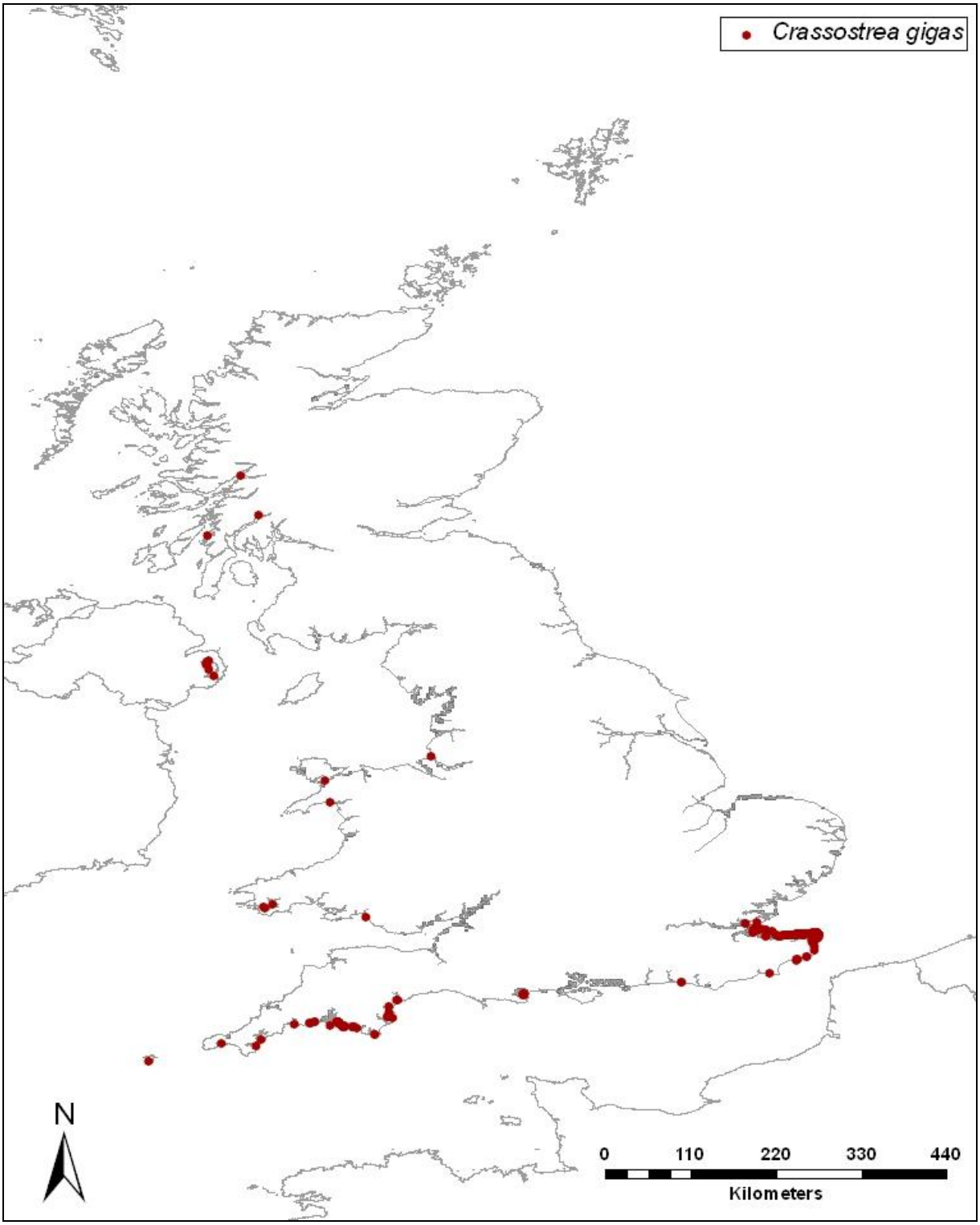

Figure 8. **Final derived data layer for the Pacific oyster *Crassostrea gigas*.**

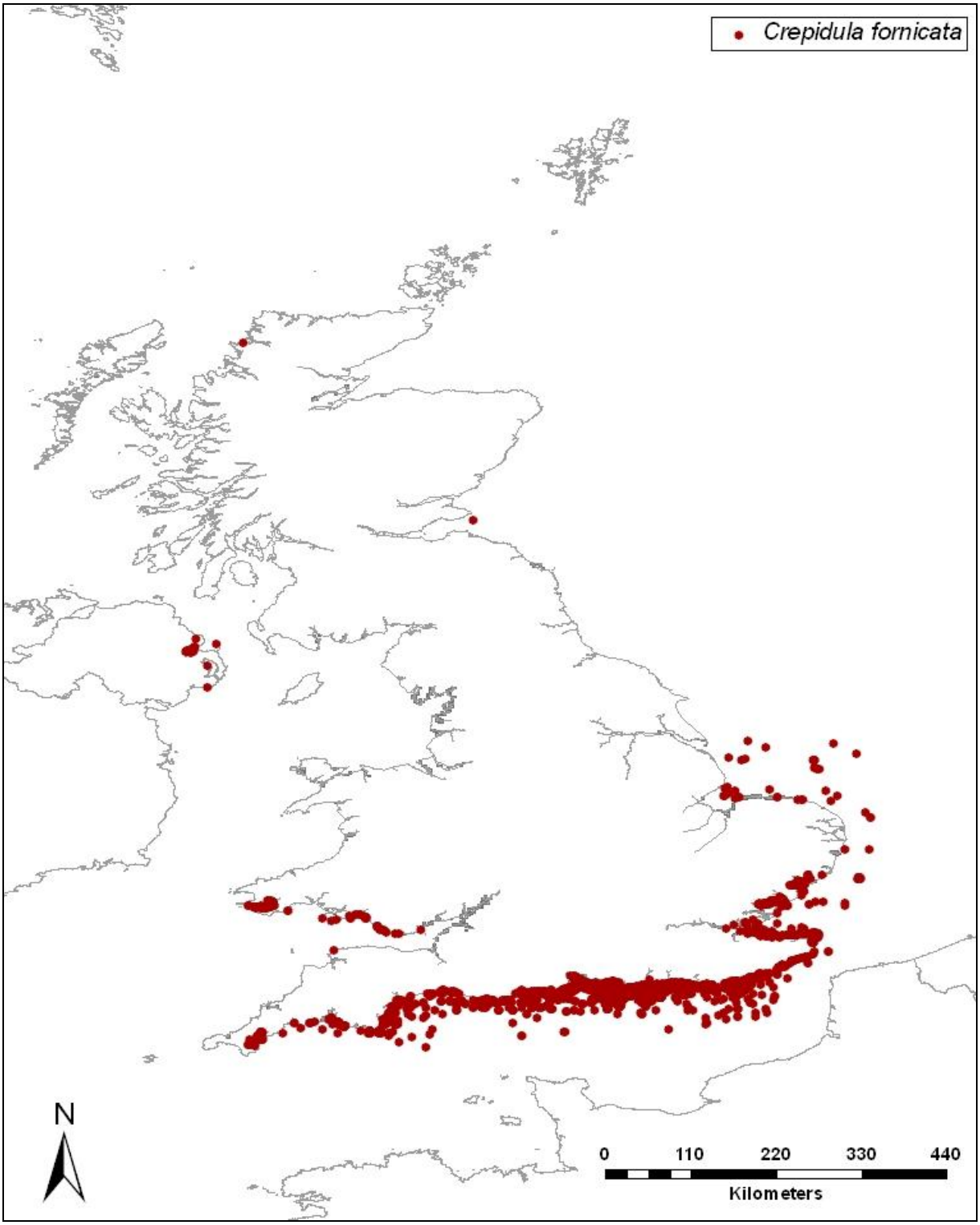

Figure 9. **Final derived data layer for the slipper limpet *Crepidula fornicata*.**

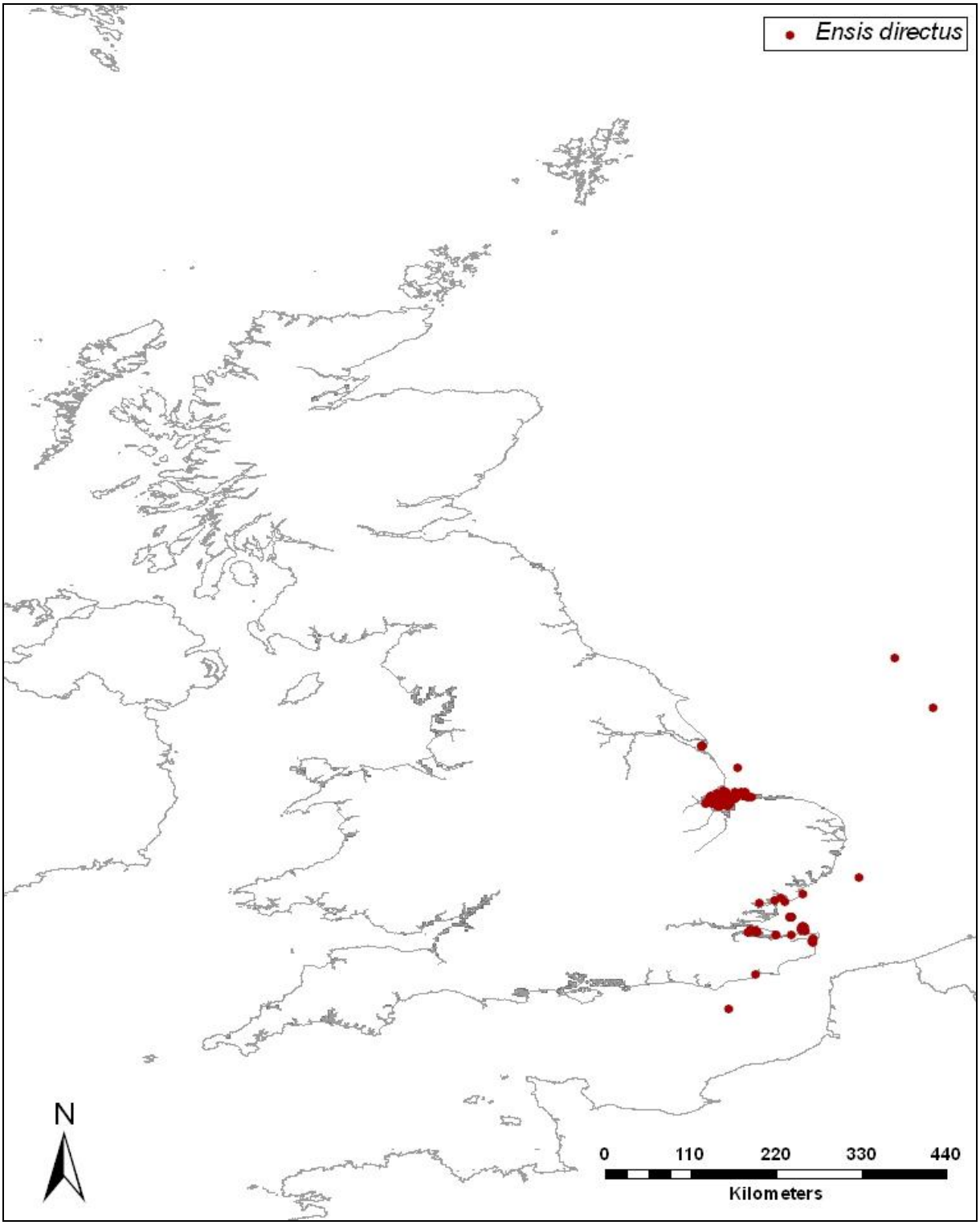

Figure 10. **Final derived data layer for the American jacknife clam *Ensis directus*.**

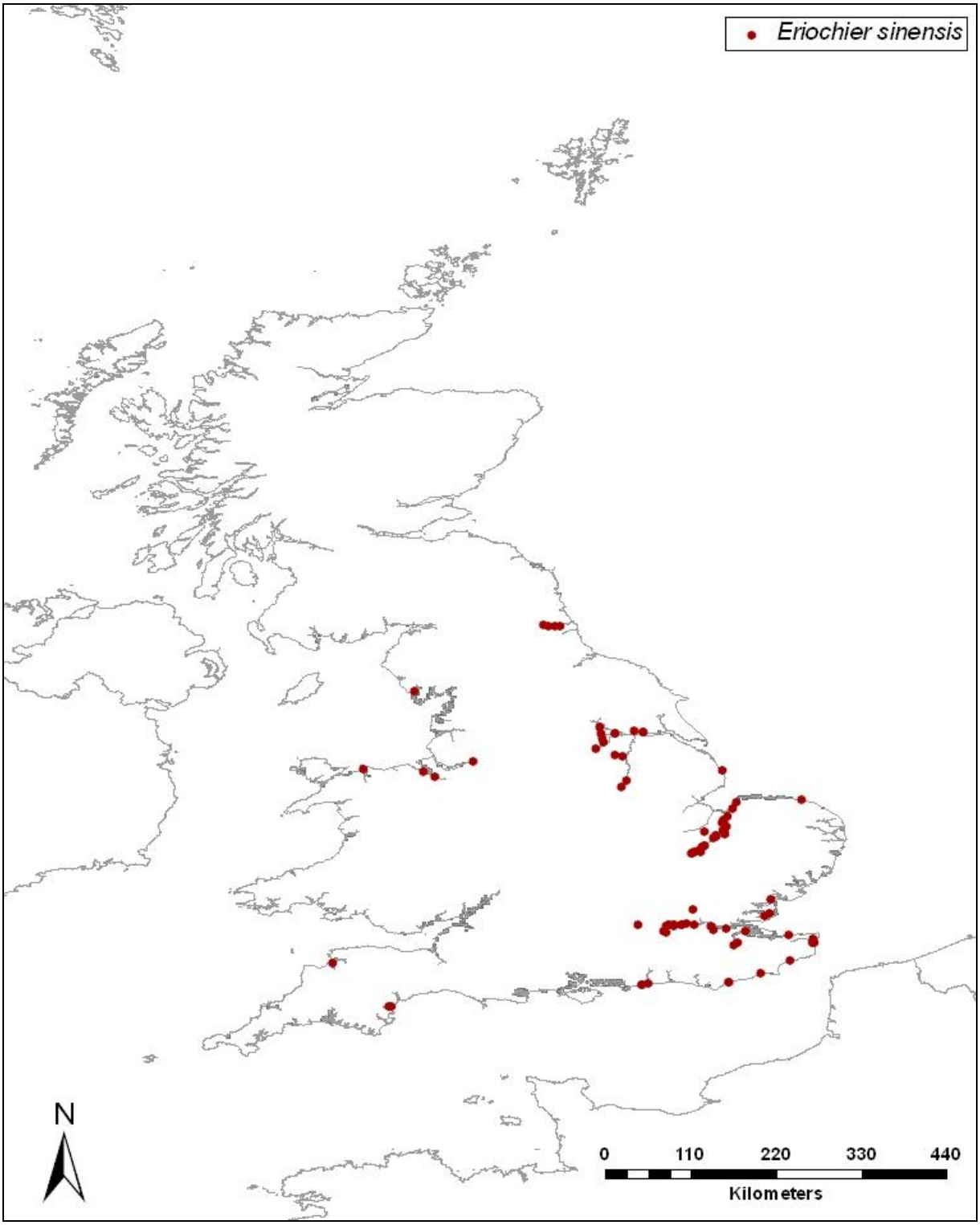

Figure 11. Final derived data layer for the Chinese mitten crab *Eriochier sinensis*.

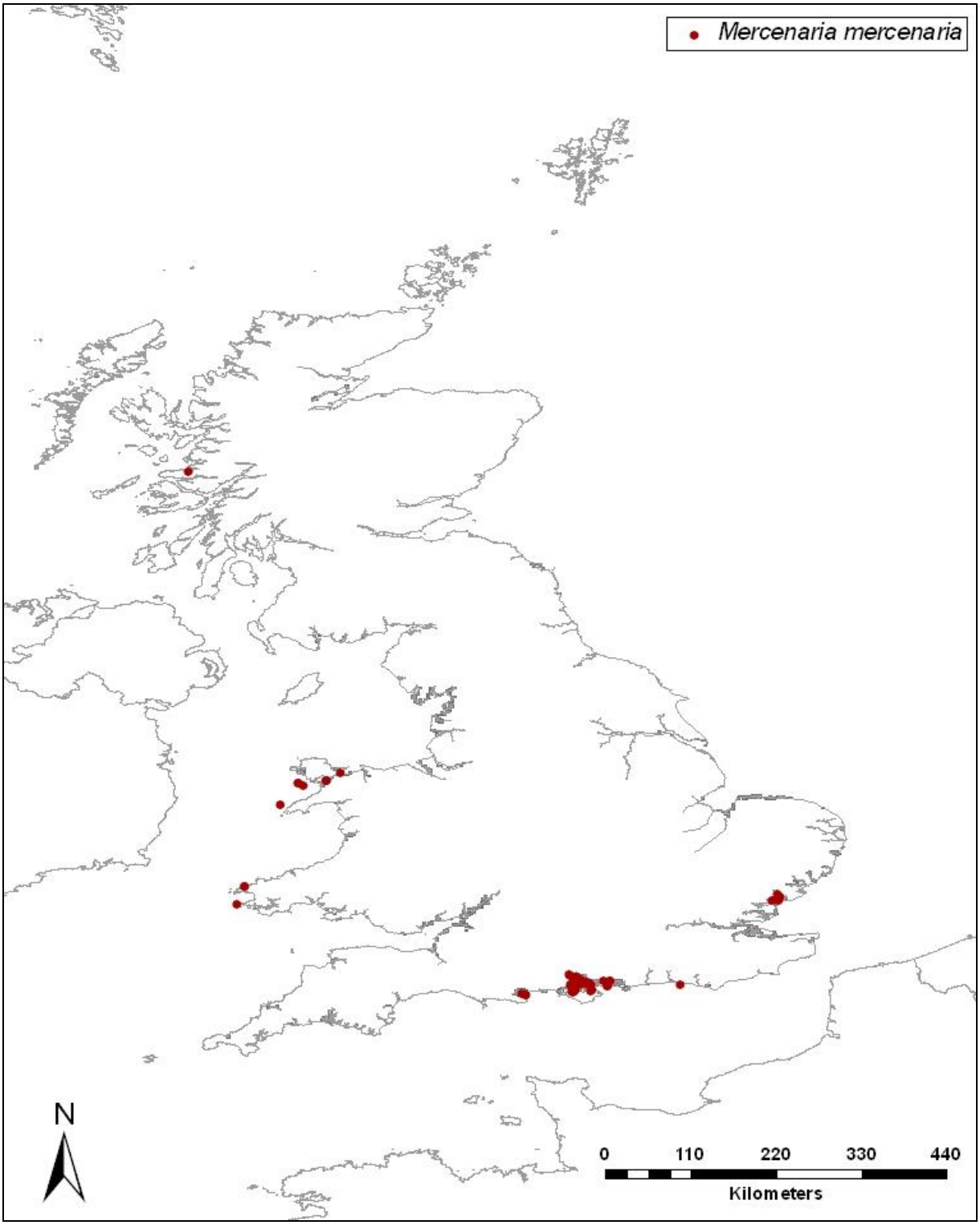

Figure 12. Final derived data layer for the hard-shell clam *Mercenaria mercenaria*.

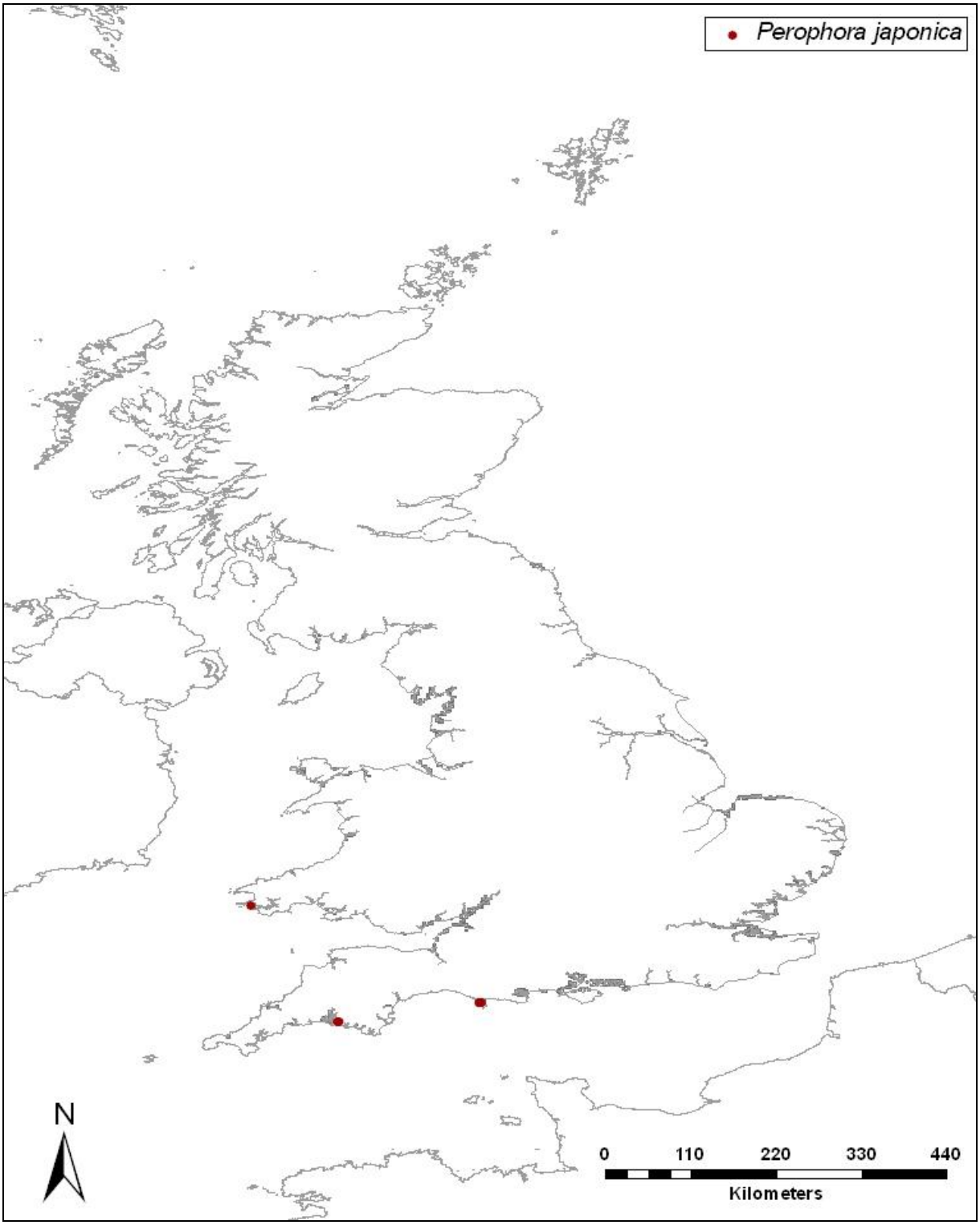

Figure 13. **Final derived data layer for the sea squirt *Perophora japonica*.**

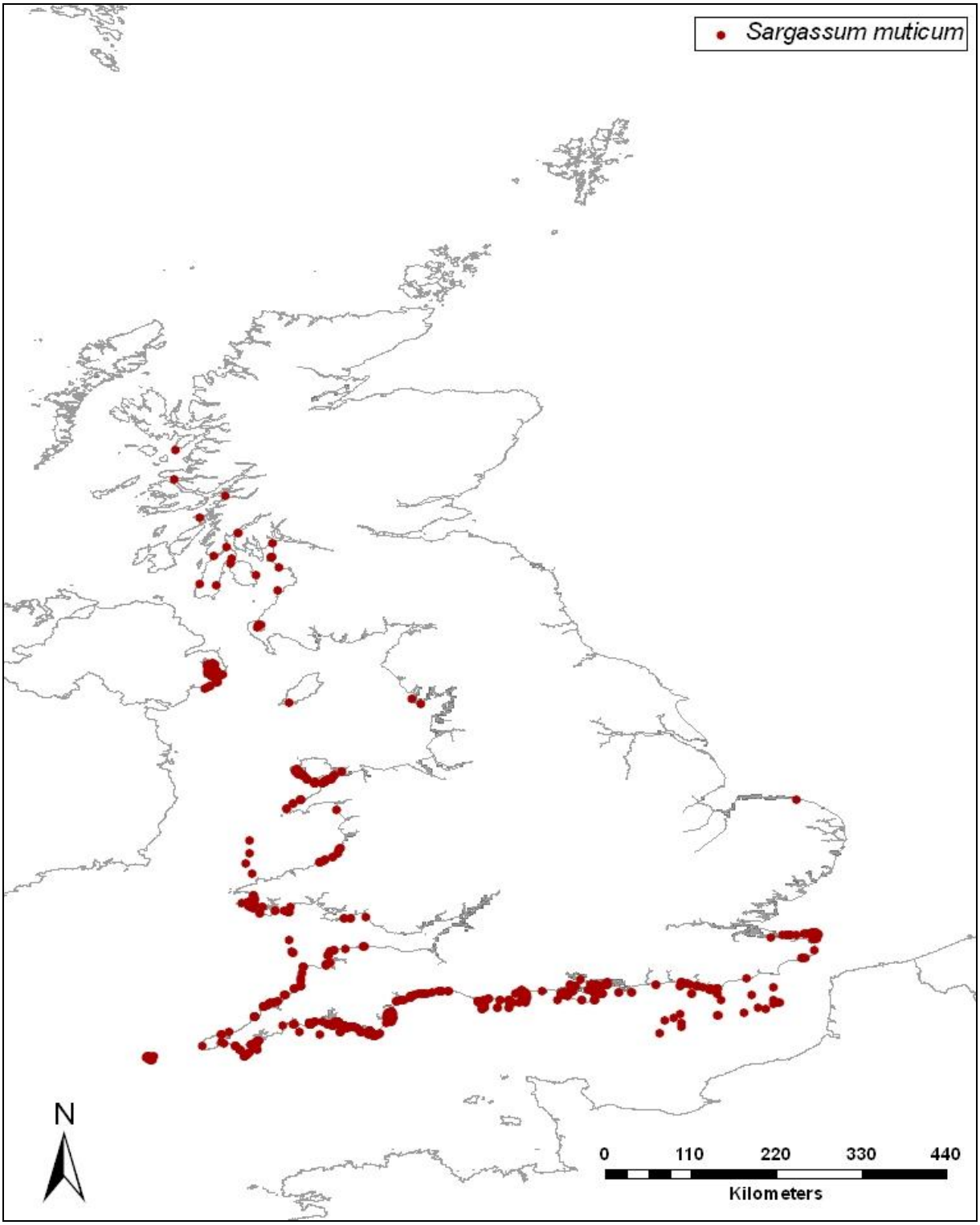

Figure 14**. Final derived data layer for wireweed *Sargassum muticum*.**

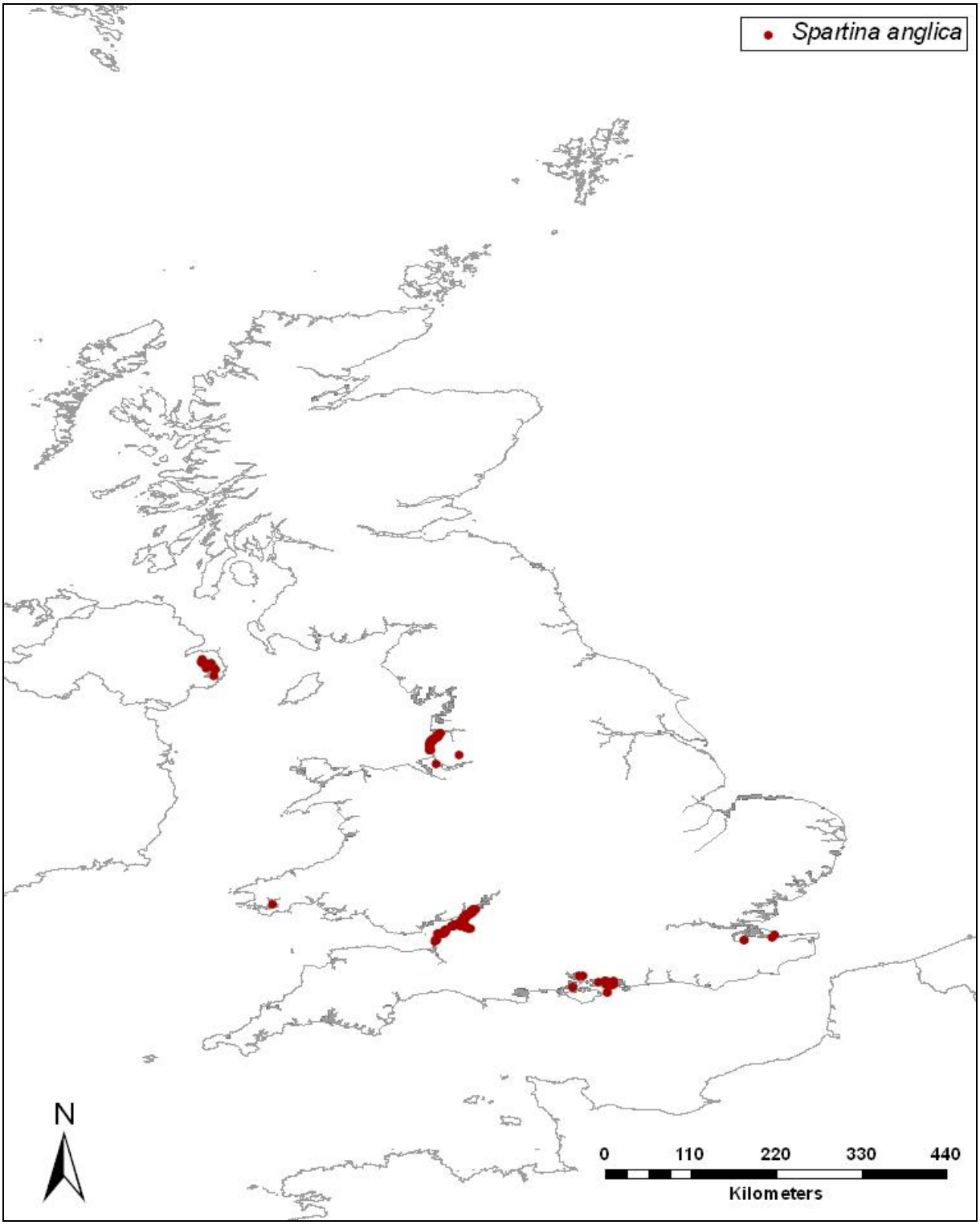

Figure 15. **Final derived data layer for common cord-grass *Spartina anglica*.**

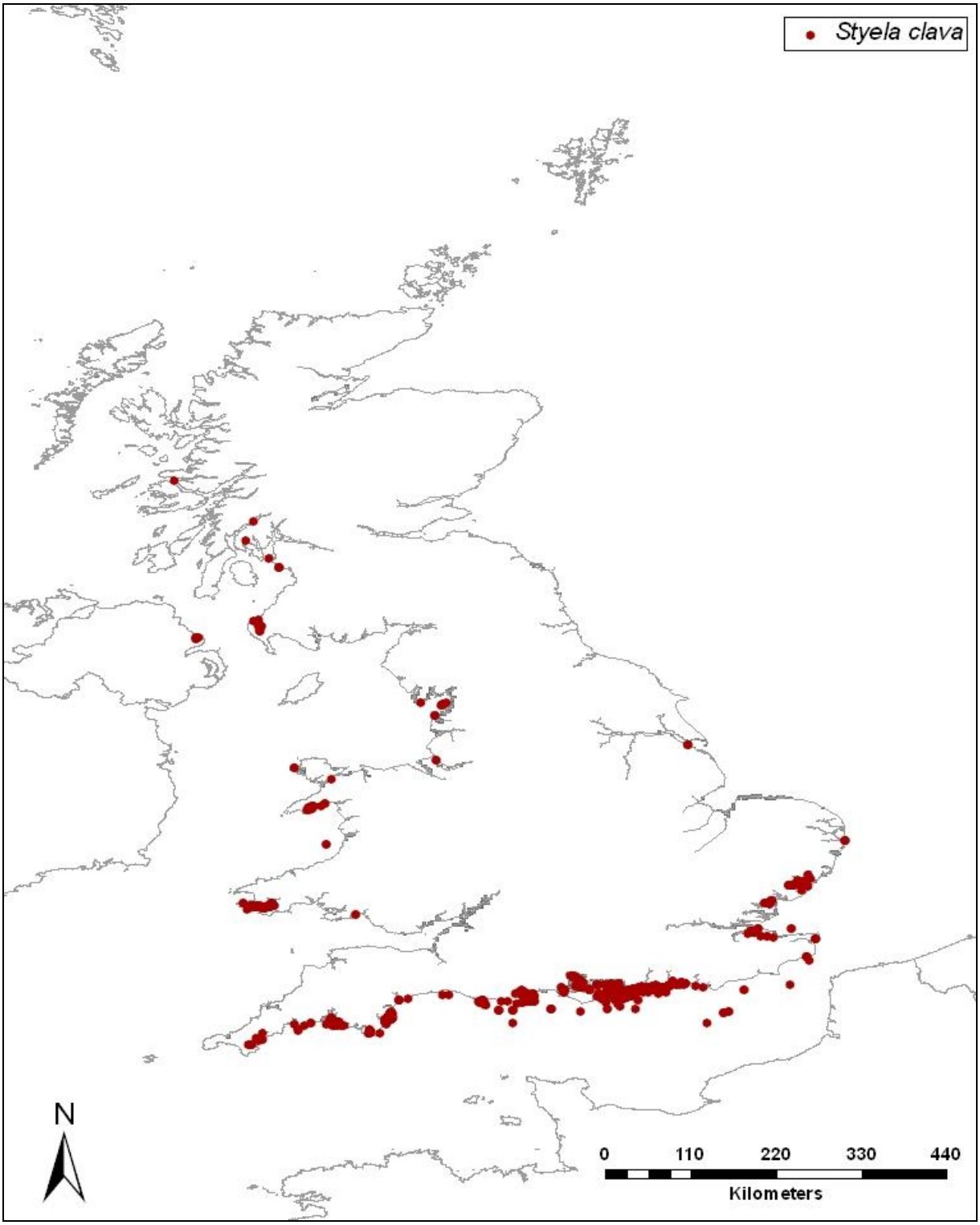

Figure 16. **Final derived data layer for the leathery sea squirt *Styela clava*.**

4. Issues and Further Considerations

4.1 The project represented one of the largest data collation exercises ever undertaken for marine species and identified a number of issues related to access, collation and onward dissemination of data gathered from a wide variety of sources. The data providers recognised the importance of the project and were keen to be involved.

4.2 The collation of large volumes of data from disparate providers highlighted a number of issues which are discussed below.

4.1 Ease of Access and Supply of Data

4.3 A number of organisations holding key datasets were very slow to respond to data requests in spite of repeated attempts. We conclude that these organisations should review their data dissemination policies in order to ensure compliance with the 20 day limit specified in Environmental Information Regulation (EIR)) and the EU's Information for Spatial Information in Europe (INSPIRE) legislation.

4.4 Although many data providers believed they had given most of their data, even providers with good, central, point data storage still have issues with the archiving of GIS polygon layers. It also appears that large volumes of data are held at regional level, often with incomplete cataloguing. It is hoped that organisations will soon develop complete INSPIRE compliant metadata catalogues as this contract has shown that regional and local data is vital for use at a national level. In some cases reports had been separated from the raw or derived data meaning that data had to be digitised to allow inclusion at a less accurate level than would have been possible with the original data.

4.5 Much of the polygon data available was too generic to be of use for plotting species data (e.g. based on life forms) even though some biotopes are relevant to species data.

4.6 During the data collation we encountered two organisations who felt that their data had previously been misused, either by being given to contractors without permission or by being published prior to publication by the original authors. These instances have made the suppliers unwilling to share their data again. We suggest that guidance should be developed on the collation, storage and reuse of third party data (i.e. that not collected under contract) to ensure the optimum flow of data between organisations and the protection of the IPR of data providers. The guidance could be developed based on the existing work of organisations such as the National Biodiversity Network (NBN) or the Marine Environmental Data and Information Network (MEDIN).

4.2 Data Formatting Issues and Standards

4.7 The provision of data without relevant report references or metadata of any kind resulted in difficulties in collating information to populate the survey table. Where GIS layers were provided there was often insufficient information relating to the projection of the original data. Both OSGB36 and WGS84 are widely used and can lead to inaccuracies in the spatial rendering of the data

points. In addition the lack of metadata greatly increases the level of QA that is required.

4.8 Much of the data arrived in a variety of formats. While transformation between electronic formats is (in most cases) simple, when data were late arriving it made incorporation into the project outputs difficult.

4.9 When comparing the species in the supplied datasets against the World Register of Marine Species, there was typically a 70-80% correlation. Many mismatches were due to changes in taxonomy since the creation of the original dataset, however typographical errors and inconsistent naming conventions (such as the use of 'indet', 'crusts' etc) also meant matches had to be manually entered. Again this is a time consuming process and one that can be avoided if data providers are able to adopt existing standards for the supply of data.

4.3 Future Considerations

4.10 It is hoped that the issues raised in this data collation and mapping exercise will assist organisations in developing their data management systems for easier data flow.

4.11 Many of the issues are being addressed though the work of MEDIN, which is developing data specifications, standards and metadata standards to simplify and harmonise the exchange of marine data and metadata.

4.12 The work detailed in this report is an important first step at broadening the availability of data for key species. Carefully defined pathways for marine data flow and the adoption of MEDIN standards and specifications will facilitate the update of these derived data products and provide a solid foundation for future marine data management.

4.13 These data layers constitute the best available knowledge at the current date, but provide an incomplete picture, and this must be taken into consideration in their application. Further reduction in data quality would only act to reduce the applicability of these layers, both for MCZ Regional Projects and their potential subsequent wider use in spatial planning.

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Appendix A. Validation Checklist

1. Check fields complete
OrigName
SciName
SurvID
Date
Location
Sample
Event
Lat
long
Determiner
Status
CoordinatePrecision (m)
2. Check points
Within UK territorial limits?
Any on land?
Remove duplicate records

Appendix B. Original Species list and WoRMS match

ScientificName	Phylum	AphiaID	AphiaID (accepted)	WoRMS ScientificName	TSN	ScientificName Author
Asparagopsis armata	Rhodophyta	144438	144438	*Asparagopsis armata*	11776	Harvey, 1855
Botrylloides violaceus	Chordata	148715	148715	*Botrylloides violaceus*		Oka, 1927
Crepidula fornicata	Mollusca	138963	138963	*Crepidula fornicata*	72623	(Linnaeus, 1758)
Codium fragile fragile	Chlorophyta	370562	370562	*Codium fragile fragile*		(Suringar) Hariot, 1889
Caprella mutica	Arthropoda	146768	146768	*Caprella mutica*	656389	Schurin, 1935
Corella eumyota	Chordata	173223	173223	*Corella eumyota*	159160	Traustedt, 1882
Crassostrea gigas	Mollusca	140656	140656	*Crassostrea gigas*	79868	(Thunberg, 1793)
Mercenaria mercenaria	Mollusca	141919	141919	*Mercenaria mercenaria*	81496	(Linnaeus, 1758)
Perophora japonica	Chordata	103758	103758	*Perophora japonica*	206908	Oka, 1927
Ensis (directus) americanus	Mollusca	152356	140732	*Ensis directus*	205635	(Conrad, 1843)
Eriocheir sinensis	Arthropoda	107451	107451	*Eriocheir sinensis*	99058	H. Milne-Edwards, 1853
Spartina anglica	Angiospermophyta	234043	234041	*Spartina townsendii var. anglica*	505302	C.E. Hubbard
Sargassum muticum	Ochrophyta	145559	145559	*Sargassum (Bactrophycus) muticum*	11390	(Yendo) Fensholt, 1955
Styela clava	Chordata	103929	103929	*Styela clava*	159337	(Herdman, 1881)
Undaria pinnatifida	Ochrophyta	145721	145721	*Undaria pinnatifida*		(Harvey) Suringar, 1872

Appendix C. Data Contacts

The names of individuals have been removed to comply with the Data Protection Act, but have been retained for future reference.

Organisation	Data required	Data offered?	Data received?
Adur District Council	*Edwardsia ivelli*	No data	NA
AFBI	All species and biotopes	Yes	Yes
AFBI	Passed us on to Matt Service	NA	NA
Artoo Marine Consultants	Saline lagoons	Yes	Yes
Botanical Society of the British Isles	*Spartina anglica* distribution	Yes	Yes
Botanical Society of the British Isles	*Spartina anglica* distribution, tetrad shapefile	Yes	No
BPS	Seaweed data	Yes	Yes
Bristol Record Centre	Seaweed data bpc	Yes	Yes
Bristol Record Centre	*Tenellia* and *Spartina* records	Yes	Yes
British Phycological Society	Seaweed data	Yes - atlas and herbarium data - also possible seaweed survey data	NA
Cefas	Benthic invertebrate data	Yes	Yes
Cefas	Other relevant Cefas data	Yes seahorse data being sent	Yes
Cefas	Species distribution	Yes	Yes
Chichester Harbour Conservancy	*Heleobia stagnorum* distribution	Referred to other	NA
CMACS	Isle of Man intertidal reports	Yes	Yes
Conchological	*Heleobia stagnorum* distribution	Yes	Yes, and compiled

Organisation	Data required	Data offered?	Data received?
Society			physical data also for other species
Conchological Society	Mollusc data	Yes	Yes
Cornwall Wildlife Trust	*Amphianthus dorhnii* distribution records	Yes	yes
Countryside Council for Wales	Expert for map checking	NA	NA
Countryside Council for Wales	Saltmarsh distribution in Wales	Yes	Yes
Devon Sea Fisheries Committee	*Crepidula fornicata* distribution records	Yes	Yes
DOENI	Species and biotope data	Yes	Yes
Dorset Wildlife Trust	Species and biotope mapping	Biotope data not available	No
DWT	Species and biotope mapping	Yes	Biotope data not available
EMU	MB0102 Interpreted biotopes (1A) layers	Yes	Yes
Environment Agency	*Eriocheir sinensis* data	Yes	Yes
Environment Agency	Species and biotope data	Yes	Yes
Environment Agency	Species and biotope data	Yes	Yes
Environment Agency	Species and biotope data	NA	NA
Environment Agency	Species and biotope data	Yes	Yes
Environment	Species and biotope data	NA	NA

Organisation	Data required	Data offered?	Data received?
Agency			
ERCCIS	Maërl & stallked jellyfish distribution in Cornwall	Yes	Yes
Geodata	Offshore data ALSF/REA etc	Yes	Yes
Hampshire Wildlife Trust	*G.insensibilis*. All species & habitats. Hotspots	*G.insensibilis* so far	*G.insensibilis* so far
Individual	Fal & Helford records	Yes	Yes
Individual	Cornwall records, *Victorella pavida* data	Yes	Yes
Individual	Expert for map checking	NA	NA
Individual	Expert for map checking	NA	NA
Individual	Expert for Scotland for map checking	NA	NA
Individual	*Leptopsammia* & *Amphianthus* records	Yes	Yes
Individual	Welsh non native records	Yes	Yes
Isle of Man government	Species records in the Isle of Man	Yes	Yes
Isles of Scilly Wildlife Trust	Maërl records for Cornwall	Suggested good contacts	NA
Natural England	*Alkmaria* records	Yes paper	Yes
JNCC	JNCC data holdings	Yes	Yes
Kent & Essex Sea Fisheries Committee	*Ensis americanus* distribution records	Yes	Yes
Kent Wildlife Trust	Species and biotope data	Yes	Yes
Lancing Parish Council	*Edwardsia ivelli*	Passed on to ranger	NA
Marine Biological Association	Deep sea data	Yes	Yes
Marine Biological Association	Marclim data	Yes	Yes
Marine Biological	Non native species records	Yes	Yes

Organisation	Data required	Data offered?	Data received?
Association			
Marine Biological Association	Non-native species record check	Yes papers and non published records	Yes
Marine Fish Information Services	*Hippocampus* species, *Gobius cobitis* records	Yes	Yes
Marine Scotland	*Pachycerianthus multiplicatus* and *Funiculina* data	Yes	Yes
Marine Scotland	Species and biotope data	Passed on to other agencies	NA
MarLIN	MarLIN records	Yes	Yes
Marine Biological Association	Species and biotope data	Yes	Yes
Merman / BODC	CSEMP data	Yes	Yes
Merseyside Biobank	*Spartina anglica* records	Yes	Yes
Natural England	Species and biotope data	Yes	Yes
Natural England contractor	*Crassostrea gigas* in Kent area	Yes	Yes
Natural History Museum	*Eriocheir sinensis* distribution	Yes	Yes
Natural History Museum	Expert for map checking	NA	NA
NMGW	*Arctica islandica* and *Thyasira gouldii*	Yes	Yes
North East Sea Fisheries Committee	*Palinurus* distribution records	Yes	Yes
Northern Ireland Environment Agency	Species and biotope data	Yes	Yes

Organisation	Data required	Data offered?	Data received?
Plymouth Marine Laboratory	Scillies All-Taxa Biodiversity Index	Yes	Yes
Queens University, Belfast	Non native seaweeds	Yes database	Data not available
Ranger	*Edwardsia ivelli*	Yes	Yes
Research thesis	*Crassostrea.gigas* in Devon	Yes	Partial data received
Research thesis	*Crassostrea.gigas* in Strangford Lough	Yes	No
Salacia Marine	*Palinurus elephas* distribution	Suggested good contacts	NA
Scottish Association for Marine Science	*Caprella mutica* distribution records	Yes	Yes
Scottish Association for Marine Science	Species and biotope data	Yes	No
Scottish Environmental Protection Agency	Species and biotope data	Yes	Yes, but related to fishfarms
Scottish Environmental Protection Agency	Species and biotope data	Yes	Partial
Scottish Natural Heritage	Expert for map checking	NA	NA
Scottish Natural Heritage	Saline lagoons, *Spartina* and saltmarsh	Yes	Yes
Scottish Natural Heritage	Species and biotope data	Yes	Yes
Seafish	*Crassostrea*	Yes	Report contained no new data
Seahorse Trust	UK seahorse records	Yes but not at full resolution	Only partial data supplied

Organisation	Data required	Data offered?	Data received?
Seasearch	Expert for map checking	NA	NA
Seasearch	*Leptopsammia* & *Amphianthus* records	Yes	Yes
Seasearch	Seasearch records and expert for map checking	Yes	Yes
Shellfish Association GB	UK shellfish distribution records	Report sent	Yes
Southern Sea Fisheries Committee	*Palinurus elephas* distribution	No relevant data	NA
Student	*Caprella mutica* distribution records	Yes	Yes
Suffolk Biological Records Centre	Suffolk records of *Spartina anglica*	Yes	Yes
Sussex Wildlife Trust	*Spartina mutica* distribution in Sussex	Yes	Yes
Tullie House Museum and Art Gallery	*Eriocheir sinensis* in Duddon Estuary	Yes	No
Ulster Museum	*P.multiplicatus* in N.I.	Confirmation of absence in N.I.	Yes
University of Bangor	English Channel dredge results	Yes	Yes
University of Bangor	Expert for map checking	NA	NA
University of Bangor	*Modiolus* and North Wales data	Yes	Yes
University of Bournemouth	IOW records	Yes	Yes
University of Brighton	Saline lagoon species	Yes	Yes
University of	Expert for map checking	NA	NA

Organisation	Data required	Data offered?	Data received?
Bristol (retired)			
University of Plymouth	Maërl data	Yes	Yes
University of Portsmouth	Seaweed expert non natives for map checking	NA	NA
University of Ulster	*Tenellia* record	Yes	Yes
University of Bristol	*Arrhis phyllonyx* data	No data	NA
West Sussex county council	Saline lagoon species	No data	NA

Appendix D. Restriction of Use Document

MB0102 Task Reference	Derived Data Layer Title	Specific layers included in derived data layer	Restriction & Access	Copyright/Reference/ Acknowlegement	Comment	DAC
2D	Non Native Species	*Asparagopsis armata; Botrylloides violaceus; Crepidula fornicata; Codium fragile; Caprella mutica; Corella eumyota; Crassostrea gigas; Mercenaria mercenaria; Perophora japonica; Ensis (americanus) directus; Eriocheir sinensis; Spartina anglica; Sargassum muticum; Styela clava; and Undaria pinnatifida.*	Public version freely available is gridded. Non public point or polygon data to 10km grid squares resolution	Crown Copyright – Defra – MB0102	All layers supplied for the specific uses outlined. They may not be disaggregated or used for any other purpose other than that specified in the license without the prior consent of the original data provider. Where agreed all data will be made available via the NBN.	DASSH

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