Invasive marine species are considered to be those species that have been introduced and are known to have a negative impact on the Welsh marine environment. CCW maintains records of their distribution in Welsh waters.
The Countryside Council for Wales champions the environment and landscapes of Wales and its coastal waters as sources of natural and cultural riches, as a foundation for economic and social activity, and as a place for leisure and learning opportunities. We aim to make the environment a valued part of everyone’s life in Wales. We are the government’s advisors on all aspects of the environment and nature conservation in Wales.

Our specialist staff have unique in-depth knowledge of the Welsh environment and can provide strategic advice on the environmental evidence priorities and lead the research required.

This technical document forms part of a series describing the spatial marine evidence datasets available in the Countryside Council for Wales. It was produced by the Marine Evidence Working Group chaired by Catherine Duigan, Head of the Marine and Freshwater Ecosystems Group (c.duigan@ccw.gov.uk). Other group members include Carl Atkinson, Aethne Cooke, Cameron Edwards, Jenny Kamp, Mary Lewis, Kirsty Lindenbaum, Kirsten Ramsay, Ana Ruiz, Karen Robinson, Kate Smith, Helen Wilkinson. This project was co-ordinated by Kirsty Lindenbaum (k.lindenbaum@ccw.gov.uk) and Mary Lewis (m.lewis@ccw.gov.uk) , and Monica Jones (mn.jones@ccw.gov.uk) is the key contact for data access and maps.
Marine Invasive Non-native Species

Introduction
Non-native species are considered to be those species that have been introduced to areas outside of their natural range. Species can be introduced to new environments either accidentally (e.g. by transport and discharge of ballast water) or deliberately (e.g. through the import of fish and bivalves for commercial purposes).

Once established in a new region, non-native species may cause effects ranging from undetectable to displacement of native communities i.e. invasive. The introduction of non-native species may also bring diseases which may adversely affect a range of interests from commercial use of the marine environment to wildlife conservation.

To date, over forty species of marine aliens have been reported from Welsh waters (Table 1). Seven of these are considered by CCW to be invasive and are known to have negative environmental and socio-economic impacts, a further four are considered a potential risk in Welsh waters and two are considered to be low risk. For the remainder, the potential impact is not yet known but may be significant.

See Eno et al., 1997 for additional information.

Data Description
CCW collates records of non-native species which have been introduced directly or indirectly by human activity into the Welsh marine environment. These are presented as a series of GIS layers, one for each non-native species.

The records are collated from a variety of sources, including data from CCW's Phase 1 Intertidal Survey (see chapter 2), Marine Recorder data holdings, NBN Gateway web source, MarLIN/DASSH web source, DEFRA MPA non-native GIS layers, LRC’s (Local Record Centres), and other ad-hoc records collated by CCW staff or supplied by third parties. The source of the data is documented within the table attributes.

Geographical and Temporal Extent:
The majority of records were collected on an ad hoc basis or as incidental records during other surveys, but new records are added to the datasets as they become available. Records date from the early 1900’s onwards. The majority of the species occur along the coastal strip and are mainly associated with areas where there are intense commercial and recreational activities, such as the Milford Haven Waterway.

Data Confidence and Limitations:
Our understanding of alien species biology is increasing, particularly on how they are introduced and dispersed, and the environmental factors that affect this.

The majority of the records are validated and verified, and confidence on the distribution of easily identified species and publicized species is generally high. However some species are difficult to identify without specialist knowledge and skills.
As the maps are based on ad-hoc and incidental records they do not necessarily reflect an accurate distribution of the species. Absence of a record does not by default reflect absence of a species. Some species spread rapidly, so the extent of their distribution and the scale of their abundances may be out-of-date. Some records, particularly older records may not have precise grid references.

**Value for Conservation and Planning**

Activities that are known to be important vectors for non-native invasions include:

- recreational boating;
- fisheries / aquaculture;
- ship recycling;
- marine industries (oil, gas, renewable and dredging) and commercial shipping (Ballast water and biofouling).

Marine planning has the potential to play an important part in controlling non-native species distribution, through the appropriate location and control of these activities. As such, understanding the current distribution of non-natives is essential, as well as areas with potential for further introductions.

Wales has international, European and UK legal obligations to control non-native invasive species, including obligations under:

- The Bern Convention;
- The Convention on Biological Diversity;
- Wildlife and Countryside Act; and
- The Natural Environment and Rural Communities Act.

Invasive non-native species have potential negative impacts on the local economy and biodiversity. Wales is committed to halting the loss of biodiversity through the Convention on Biological Diversity and biodiversity targets have been included in the Wales Environment Strategy.

A recent study has estimated costs suffered in Wales by some marine industries (such as aquaculture and shipping) due to invasive non-native marine species are around £4,928,000 per annum (Williams et al. 2010).

**How Should This Information Be Used**

The marine non-native data layers show the known distribution of these species and should be combined with knowledge of which species have the potential to invade new areas. They should be used where the likelihood for introducing, spreading or increasing the abundance of alien species could arise from new developments. Also the maps may be relevant when considering applications for developments or consents in particular locations. In addition, they should be used when advising on fisheries operations and vessel movements. For high threat species (such as the Carpet Sea Squirt, *Didemnum vexillum*) it may also be advantageous to model the potential spread of the species particularly in relation to sensitive protected sites (see chapter 6).
CCW and other environmental agencies are developing species action plans to control marine non-native species, and should be consulted on relevant developments.

Restrictions on use
Currently there are no restrictions on use of these data layers.

References

Table 1: Available data layers for non-native species known to currently exist in Wales.

<table>
<thead>
<tr>
<th>Invasive</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Botrylloides violaceus</td>
<td>Sea squirt</td>
</tr>
<tr>
<td>Crassostrea gigas</td>
<td>Portuguese oyster</td>
</tr>
<tr>
<td>Crepidula fornicata</td>
<td>American slipper limpet</td>
</tr>
<tr>
<td>Didemnum vexillum</td>
<td>Colonial sea squirt</td>
</tr>
<tr>
<td>Elminius modestus</td>
<td>Australasian barnacle</td>
</tr>
<tr>
<td>Eriocheir sinensis</td>
<td>Chinese mitten crab</td>
</tr>
<tr>
<td>Sargassum muticum</td>
<td>Wireweed</td>
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<tr>
<td>Corella eumyota</td>
<td>Sea squirt</td>
</tr>
<tr>
<td>Rhithropanopeus harrisii</td>
<td>Dwarf crab</td>
</tr>
<tr>
<td>Low Risk</td>
<td></td>
</tr>
<tr>
<td>Codium fragile subsp. Tomentosoides</td>
<td>Green sea fingers</td>
</tr>
<tr>
<td>Corophium sextonae</td>
<td>Amphipod</td>
</tr>
<tr>
<td>Styela clave</td>
<td>Leathery sea squirt</td>
</tr>
<tr>
<td>Tricellaria inoptiata</td>
<td>Bryozoan</td>
</tr>
<tr>
<td>Potential Risk</td>
<td></td>
</tr>
<tr>
<td>Anotrichium furcellatum</td>
<td>Red alga</td>
</tr>
<tr>
<td>Antithamnionella spirographidis</td>
<td>Red alga</td>
</tr>
<tr>
<td>Antithamnionella ternifolia</td>
<td>Red alga</td>
</tr>
<tr>
<td>Asparagopsis armata</td>
<td>Harpoon weed</td>
</tr>
<tr>
<td>Balanus amphitrite</td>
<td>Barnacle</td>
</tr>
<tr>
<td>Bonnemaisonia hamifera</td>
<td>Red alga</td>
</tr>
<tr>
<td>Botrylloides cf. diegense</td>
<td>Sea squirt</td>
</tr>
<tr>
<td>Bugula neritina</td>
<td>Bryozoan</td>
</tr>
<tr>
<td>Caprella mutica</td>
<td>Amphipod</td>
</tr>
<tr>
<td>Codium fragile subsp. atlanticum</td>
<td>Green sea fingers</td>
</tr>
<tr>
<td>Colpomenia peregrina</td>
<td>Oyster thief</td>
</tr>
<tr>
<td>Dikerogammarus villosus</td>
<td>Killer shrimp</td>
</tr>
<tr>
<td>Feldmannnophycus okamurae</td>
<td>Red alga (pom pom weed)</td>
</tr>
<tr>
<td>Ficopomatus enigmaticus</td>
<td>Tubeworm</td>
</tr>
<tr>
<td>Goniodella gracilis</td>
<td>Polychete</td>
</tr>
<tr>
<td>Grateloupia turuturu</td>
<td>Red Alga</td>
</tr>
<tr>
<td>Haliplanella lineata</td>
<td>Orange striped anemone</td>
</tr>
<tr>
<td>Heterosiphonia Japonica</td>
<td>Red Alga</td>
</tr>
<tr>
<td>Mercenaria mercenaria</td>
<td>American hard shelled clam</td>
</tr>
<tr>
<td>Mya arenaria</td>
<td>Sand Gaper clam</td>
</tr>
<tr>
<td>Myliopsis leucophaeta</td>
<td>False dark mussel</td>
</tr>
<tr>
<td>Mytilicola intestinalis</td>
<td>Parasitic copepod</td>
</tr>
<tr>
<td>Mytilus galloprovincialis</td>
<td>Mollusc</td>
</tr>
<tr>
<td>Perophora japonica</td>
<td>Sea squirt</td>
</tr>
<tr>
<td>Petricola pholadiformis</td>
<td>American Piddock</td>
</tr>
<tr>
<td>Polysiphonia harveyi</td>
<td>Red Alga</td>
</tr>
<tr>
<td>Potamopyrgus antipodarum</td>
<td>Jenkin’s spire shell</td>
</tr>
<tr>
<td>Solieria chordalis</td>
<td>Red Alga</td>
</tr>
<tr>
<td>Spartina anglica</td>
<td>Common cord grass</td>
</tr>
<tr>
<td>Tiostrea lutaria</td>
<td>New Zealand oyster</td>
</tr>
</tbody>
</table>

1 The data layers were last updated in July 2011, it is expected that additional species will be added as required.
Map 1: Distribution of species considered invasive, low risk or potential risk in Welsh waters (exc. *Elminius modestus* which may be found the length of the coast).

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Map 2: Distribution of selected individual species considered invasive in Welsh waters.

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Map 3: Concentration* of non-native species considered a risk in Welsh waters

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* This map is a simple analysis of the no. of different non-native species that occur per 5km square and gives an indication of 'hotspots' for non-natives species considered a risk in Welsh water. However, it is not considered a full analysis and does not take into account, density, sampling effort or relevance (age) of the records included.