Non-native species

Scottish Government
Riaghaltas na h-Alba
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Key message

More non-native species have been reported since Scotland's Marine Atlas (2011) and over a wider geographic range. West Highland, Argyll and Clyde Scottish Marine Regions are known to have established populations of non-native species classified as 'high-impact'. No Scottish Marine Regions are confirmed free of non-native species.

Non-native bryozoan *Schizoporella japonica*
© Orkney Harbour Authority

Background

Non-native species (sometimes referred to as non-indigenous species) are animals and plants that have been moved to a location out-with their native range by human action, whether intentionally or not. Those that are not under control and have a significant adverse impact on native biodiversity, or socio or economic interests are referred to as invasive non-native species (INNS). These can alter local ecology by displacing or smothering native species, can disrupt some marine economic activities and have proven to be costly to manage.

In the UK known Non-Native Species (NNS) are categorised into high-, medium-, low- or unknown-impact species, based on likely impacts on biodiversity (Water Framework Directive (WFD) classification (UKTAG, 2015a).

Figure 1:
Carpet sea squirt, *Didemnum vexillum* growing on mussel shells © Sarah Brown.

The 'high-impact NNS' found within Scotland are: Common cord-grass (Townsend's grass or rice grass, Spartina anglica); carpet sea squirt (colonial tunicate, *Didemnum vexillum*) (Figure 1) (see carpet sea squirt case study) and leathery sea squirt (*Styela clava*).

This assessment used the WFD water body classification method where the presence/absence of verified records of 'high-impact' species are recorded for each waterbody. The 2018 results were amalgamated to the scale of Scottish Marine Regions (SMR).

Each SMR was assigned a "red, blue, green" status as a gauge of the estimated pressure of NNS. SMRs that contain high-impact species were identified as 'areas of high concern' (red) and regions with moderate- or low-impact marine non-native species have been assessed as 'areas of some concern' (blue).

For further information on this topic go to: https://marine.gov.scot/sma/assessment/non-native-species

No comprehensive Scottish survey of NNS has been undertaken. All of the assessments so far are based on species reported through incidental finds, recorded during other monitoring programmes, or during local targeted surveillance following a report of non-native species.

Results

Scotland's Marine Atlas (Baxter *et al.*, 2011) suggests that some marine NNS were established in Scottish seas. Since 2011 more records of a number on NNS have been found, and better verifiable records have been kept. As public knowledge has increased some easily recognised species are being reported, and systematically verified and recorded.

Data from 2018 (Table 1) show that three high-impact species are confirmed as being established within the 11 inshore SMRs:

- Common cord-grass, Townsend's grass or rice grass;
- carpet sea squirt, colonial tunicate;
- leathery sea squirt.

Japanese kelp is verified as new to Scotland and is established in the Forth of Forth. It has not currently been confirmed as a high-impact species as a risk assessment has not been completed, and therefore it is not used for classification for this assessment. However, it has been noted and recorded as a species of concern that has colonised artificial substrate within the Firth of Forth (Forth and Tay SMR) and is the subject of measures to control and contain.

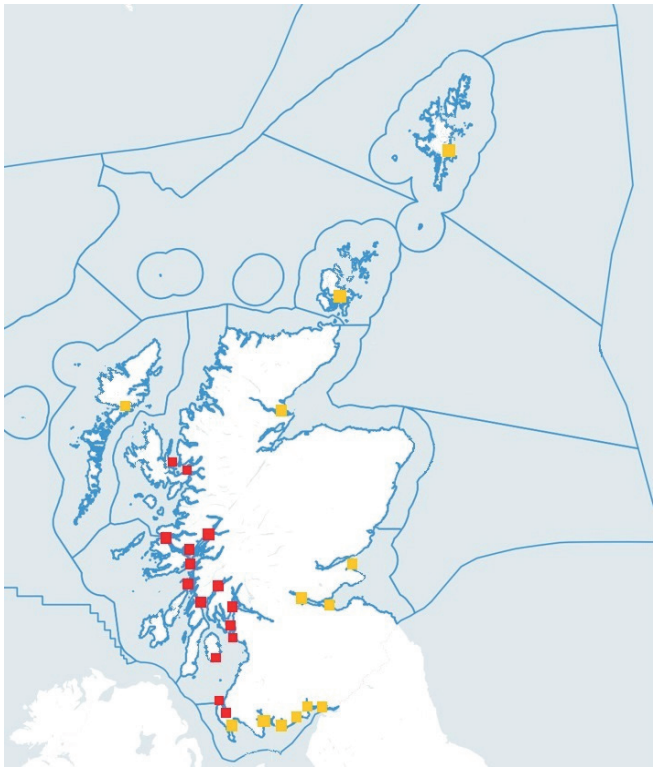


Figure 2:

Map of verified records of high-impact non-native species within Scottish Marine Regions.

Key: Yellow dots indicate known records of the coastal species Spartina; Red dots indicate all marine high-impact species. Source: SEPA 2018 WFD classification database.

Three SMRs are considered as being areas having 'many concerns' and assigned a red status as they have been confirmed as having established populations of high-impact NNS. These are West Highland (with leathery sea squirt), Argyll (with leathery sea squirt) and Clyde (with leathery sea squirt and carpet sea squirt).

Six SMRs are assessed as having 'some concerns': amber status. Three of them contain the high-impact species common cord-grass, a species that is subject to an eradication programme: Forth and Tay, Moray Firth and Outer Hebrides. Three others contain a high number of other species that are not yet understood to have an impact in UK seas: Orkney Islands, Shetland Isles and Solway. These species may behave in an invasive way should environmental conditions change (e.g. climate change scenarios) and the presence of these non-native species indicate that there is a pathway for the more damaging species to arrive.

There was insufficient information to assess North East and North Coast. There are no SMRs that have been verified as NNS free. The confidence in this assessment is low as there are no Scotland-wide systematic surveys for marine NNS.

Table 1: Assessment summary and species verified for each Scottish Marine Region.
Species data sources: Nall *et al*., 2015; Cook et al., 2015; Kakkonen, *et al*., 2019; Collin et al., 2015: Smith *et al*., 2014; SEPA 2018 WFD classification database.

Scottish Marine Region	2018 assessment	Verified high-impact non-native species records	Verified records of medium, low and unknown impact non-native species (UK TAG, 2015)
Forth and Tay	Region of some concern	Common cord-grass (*Spartina anglica*)	*Undaria pinnatifida* *Magallana gigas* (formally *Crassostrea gigas*) *Caprella mutica*
North East	Not assessed due to lack of verified data	None recorded	Unverified reports of transient populations of red seaweed (possibly *Bonnemaisonia hamifera*) and *Caprella mutica*
Moray Firth	Region of some concern	Common cord-grass (*Spartina anglica*)	
Orkney Islands	Region of some concern	None recorded	*Asterocarpa humilis* *Caprella mutica* *Colpomenia peregrine* *Corella eumyota* Red seaweeds (including *Asparagopsis armata and Bonnemaisonia hamifera*) *Tricellaria inopinata* *Schizoporella japonica*
Shetland Isles	Region of some concern	None recorded	*Corella eumyota* *Caprella mutica* *Diadumene lineata* *Fenestrulina delicia* Red seaweeds (including *Bonnemaisonia hamifera and Asparagopsis armata)* *Schizoporella japonica*
North Coast	Not assessed	Limited evidence	*Caprella mutica* *Schizoporella japonica*
West Highlands	Region of many concerns	Leathery sea squirt (*Styela clava*) Common cord-grass (*Spartina anglica*)	*Magallana gigas*
Outer Hebrides	Region of some concern	Common cord-grass (*Spartina anglica*)	*Caprella mutica;* *Sargassum muticum*
Argyll	Region of many concerns	Leathery sea squirt (*Styela clava*) Common cord-grass (*Spartina anglica*) Carpet sea squirt (*Didemnum vexillum*)	*Sargassum muticum* *Magallana gigas*
Clyde	Region of many concerns	Carpet sea squirt (*Didemnum vexillum*) Leathery sea squirt (*Styela clava*) Common cord-grass (*Spartina anglica*)	*Sargassum muticum* *Magallana* gigas
Solway	Region of some concern	Common cord-grass (*Spartina anglica*)	*Sargassum muticum* *Magallana gigas*

Conclusion

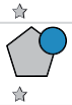
In this assessment more records of NNS were recorded as established, as defined by WFD, at a wider range of locations in Scottish inshore waters than were recorded in 2011. However, due to the lack of systematic monitoring it is difficult to understand whether the increase of records are an indication that more species have arrived and spread since 2011, or whether species were present, but overlooked, prior to 2011 and only recently recognised and recorded. It is possible that awareness-raising and implementation of biosecurity measures have led to NNS being noticed and reported by marine practitioners, in particular, species of concern for industries that are impacted by them.

Although there is little evidence of how marine NNS affect Scottish biodiversity, this assessment assumes that, the presence of a high-impact species in a system has a detrimental effect on native biodiversity. The lack of specific, Scotland-relevant, evidence means that this assessment has a low confidence. Likewise, the lack of a Scotland-wide surveillance programme makes it difficult to assign a trend for the spread, and impacts of NNS.

Knowledge gaps

Key knowledge gaps are: presence and locations of NNS and how quickly they may be spreading; evidence based understanding of impacts on biodiversity in Scotland (or the UK) as most information comes from other countries; known mechanisms of establishment and whether native species disrupted by other stressors, or simply out-competed by NNS; and environmental triggers for the invasive behaviours.

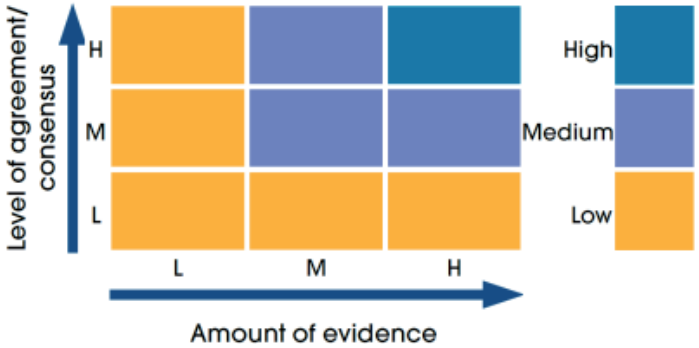
Status and trend assessment

Region assessed	Status with confidence	Trend with confidence
All Scotland		
Solway		NT
Clyde		
Argyll		
Outer Hebrides		NT
West Highlands		
North Coast		NT
Shetland Isles		NT
Orkney Islands		
Moray Firth		NT
North East		NT
Forth and Tay		NT

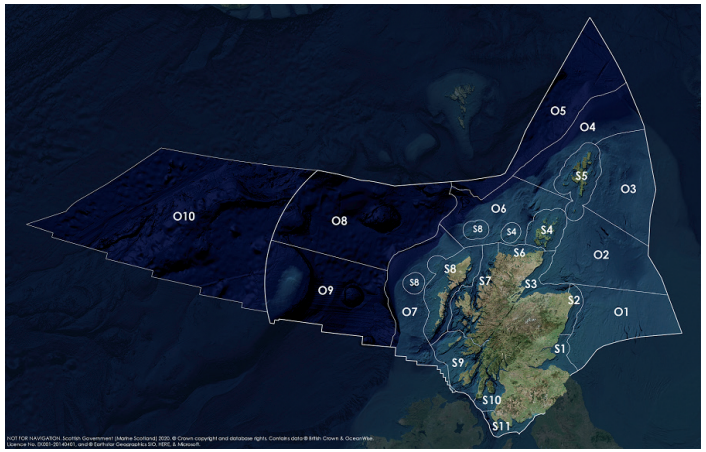
Status and trend assessment legend

Status assessment (for Clean and safe, Healthy and biologically diverse assessments)		Trend assessment (for Clean and safe, Healthy and biologically diverse and Productive assessments)	
	Many concerns		No / little change
	Some concerns		Increasing
	Few or no concerns		Decreasing
	Few or no concerns, but some local concerns		No trend discernible
	Few or no concerns, but many local concerns		All trends
	Some concerns, but many local concerns	**Confidence assessment**	
	Lack of evidence / robust assessment criteria	**Symbol**	**Confidence rating**
	Lack of regional evidence / robust assessment criteria, but no or few concerns for some local areas		Low
	Lack of regional evidence / robust assessment criteria, but some concerns for some local areas		Medium
	Lack of regional evidence / robust assessment criteria, but many concerns for some local areas		High

Overal confidence

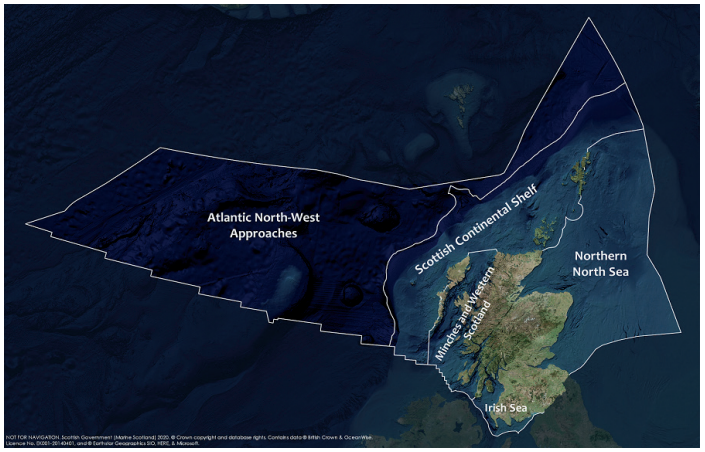


Assessment regions

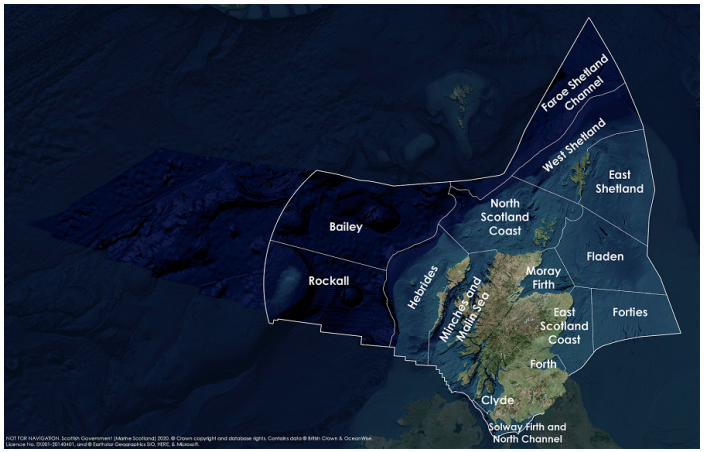


The Scottish Marine Regions (SMRs; S1 – S11) and the Scottish Offshore Marine Regions (OMRs, O1 – O10)

Key: S1, Forth and Tay; S2, North East; S3, Moray Firth; S4 Orkney Islands, S5, Shetland Isles; S6, North Coast; S7, West Highlands; S8, Outer Hebrides; S9, Argyll; S10, Clyde; S11, Solway; O1, Long Forties, O2, Fladen and Moray Firth Offshore; O3, East Shetland Shelf; O4, North and West Shetland Shelf; O5, Faroe-Shetland Channel; O6, North Scotland Shelf; O7, Hebrides Shelf; O8, Bailey; O9, Rockall; O10, Hatton.



Biogeographic, Charting Progress 2 (CP2) Regions. These have been used as the assessment areas for hazardous substances.



Scottish Sea Areas as used in Scotland's Marine Atlas 2011. These are sub divisions of the biogeographic, or Charting Progress 2 (CP2), Regions.

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NatureScot
Scotland's Nature Agency
Buidheann Nàdair na h-Alba

JNCC
Joint Nature Conservation Committee

SEPA
Scottish Environment Protection Agency

This material was published on the Scottish Marine Assessment 2020 portal, December 2020