Trends in New Records of Non-Indigenous Species (NIS) Introduced by Human Activities

MSFD Descriptor: 2 - Non-indigenous species
MSFD Criterion: 2.1 - Abundance and state characterisation of non-indigenous species, in particular invasive species

OSPAR COMMISSION

Key Message Non-indigenous species are not only a major threat to marine biodiversity, but also have considerable socio-economic impacts. Newly recorded species have been encountered at a relatively constant rate in the areas assessed. Preventing the introduction of non-indigenous species is the most cost-effective approach to management

Background

Non-indigenous species (NIS) introduced by human activities are organisms moved into new areas outside their natural range by, for example, transfer of ships' ballast water, biofouling (accumulation of organisms on ships' hulls) and aquaculture. Species that naturally increase their range are not taken into consideration, however, NIS that spread to neighbouring areas by natural means following introduction (secondary dispersal), are still considered to be NIS.

The presence of NIS can exert pressures on the marine environment with possible social, economic or environmental impacts. Invasive NIS are one of the most significant threats to global biodiversity. Removing NIS subsequent to introduction is very difficult, which means preventing their introduction is the most cost-effective approach to management, thus avoiding costs and the need for eradication measures.

This assessment focuses on trends in new records of NIS introductions into the OSPAR Maritime Area, to determine the effectiveness of measures aimed at reducing NIS introductions.

This assessment is based on new records of NIS provided by OSPAR Countries, acknowledging limitations in these data, such as discrepancies between when the presence of a new NIS was recorded and when it was actually introduced. New political initiatives (for example, the European Union Invasive Alien Species Regulation and the Marine Strategy Framework Directive (MSFD)) mean that monitoring programmes focused on detecting introductions of new NIS, are starting to be developed. These will, in time, strengthen the data available and therefore the assessment of this indicator.

Image: The invasive sea squirt *Didemnum vexillum* covering a holding tank at an oyster rearing unit © Cefas

Results

The number of new non-indigenous species (NIS) recorded for the Greater North Sea, Celtic Seas and the Bay of Biscay and Iberian Coast over the period 2003–2014, varied by year and region (**Figure 1**), but showed no overall trend in the number of new NIS records over the assessment period.

The cumulative number of new NIS introductions (**Figure 1**) provides an indication of change in trends. In the Greater North Sea there was a relatively constant linear increase in the number of new NIS recorded over time, whereas the other two regions had particular years with relatively high numbers of new NIS records which meant a similar linear increase did not occur: Celtic Seas (2006, 2012) and Bay of Biscay and Iberian Coast (2004).

Data indicate that the numbers of NIS introduced into the Celtic Seas is lower than in the Greater North Sea, Bay of Biscay and Iberian Coast. It is difficult to speculate as to why this may be the case, given the nature of the data used.

For each of the three regions assessed, there were more new NIS records in reporting period 1 (2003–2008) then in reporting period 2 (2009–2014), as outlined in **Table 1**. There was considerably more in the case of the Greater North Sea and the Bay of Biscay and Iberian Coast, although this difference was not statistically different. In the Celtic Seas there is little difference between new NIS records between reporting periods 1 and 2, and no significant difference between the datasets.

There is moderate confidence in the method and low confidence in the data availability.

OSPAR Region	Mean number of new NIS records		Statistically significant difference between means (*p* value of 0.05)
	Reporting period 1	**Reporting period 2**	
	(2003–2008)	**(2009–2014)**	
Greater North Sea	10.17	7.67	No
Celtic Seas	3	2.83	No
Bay of Biscay and Iberian Coast	38.83	3.67	No

Table 1: Mean number of new NIS records in the Greater North Sea, Celtic Seas and the Bay of Biscay and Iberian Coast, and the results of a statistical comparison between the means for both periods, by OSPAR Region

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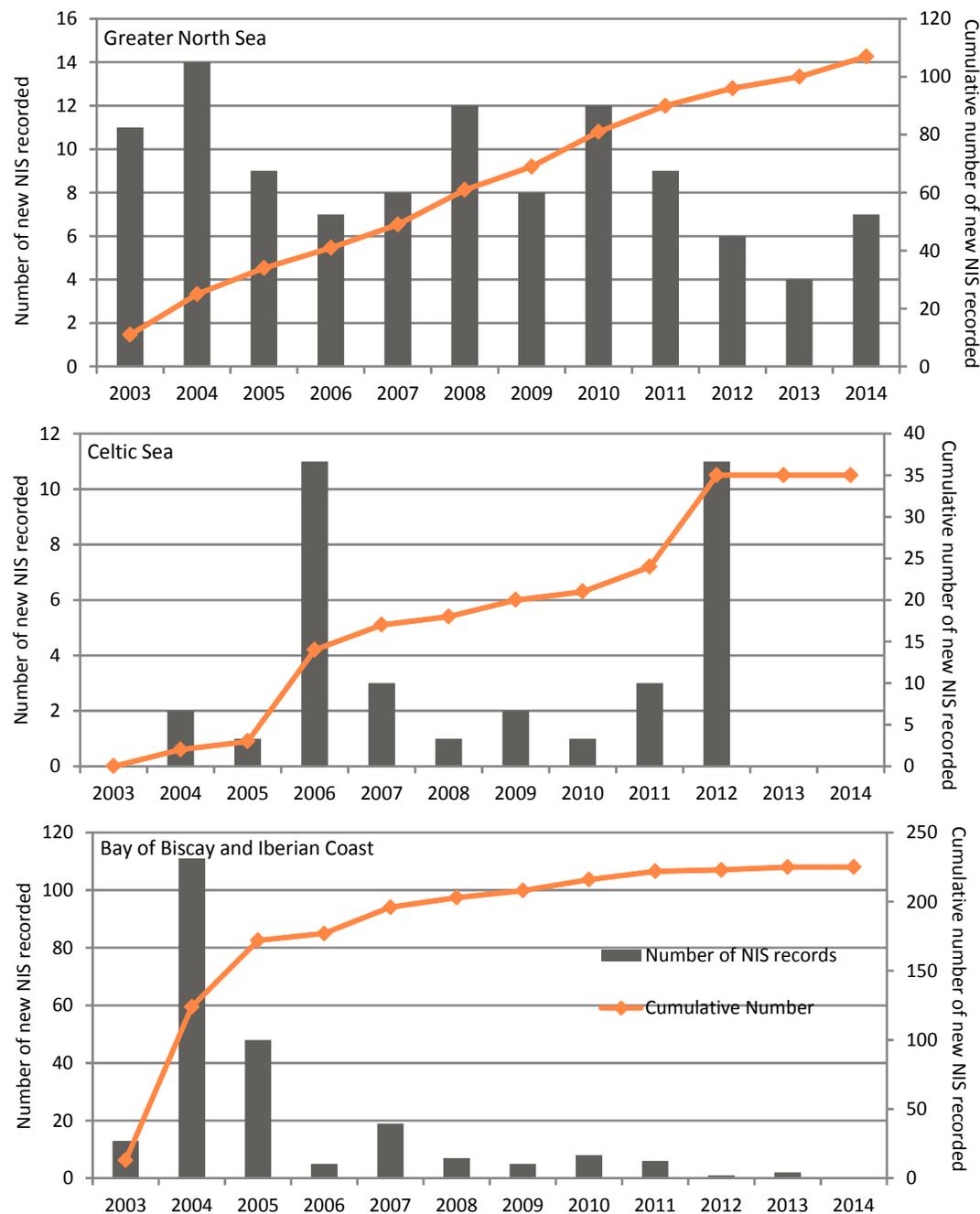

Figure 1: The number of new NIS records per year in each region assessed. Note the different scales used on each plot and on the two y-axes

Conclusion

Excluding a few years with high rates of non-indigenous species (NIS) introduction, new species have been encountered at a relatively constant rate for the three regions assessed. Therefore, more effort to reduce the current rate of introduction should be considered. Differences in the rates of introduction are relatively small between regions, and not statistically significant between the two six-year reporting periods (2003–2008 and 2009–2014).

There are a number of limitations identified with the data used. There is a lack of data with which it is possible to make an accurate and reliable assessment of introductions of new NIS in each of the regions assessed. Nevertheless, this assessment demonstrates the functionality of the method developed.

The main conclusion is, therefore, that development and implementation of coordinated and harmonised monitoring should be considered to provide accurate datasets for future assessments. In addition, to accurately determine whether the rate of introduction of new NIS is stable or changing, longer term datasets are required and hence more sustained monitoring. Emerging NIS are extremely difficult to detect thus the development of monitoring should take into account the risk based approach and a proportional application of management options for NIS once detected.

Continued implementation of the European Union MSFD, Invasive Alien Species Regulation, and Water Framework Directive, and the International Maritime Organization Ballast Water Management Convention, should ensure some of the identified gaps in monitoring are addressed.

Knowledge Gaps

Strengthening of non-indigenous species (NIS) monitoring would improve the assessment of this indicator. Efforts need to focus on a cost-effective approach to:
• Improve the baseline dataset, from available knowledge, for comparison against future assessment periods;
• Consider approaches and methodology used by other organisations and for other regulatory requirements;
• Coordinate and harmonise monitoring and response at the OSPAR regional level, in association with other Regional Seas Conventions;
• Improve data flow and management processes; and
• Investigate the development of additional methods to improve the speed and probability of early NIS detection.

Understanding of the contribution of different vectors to the introduction of NIS, would be improved through the development of complementary indicators.