



# Marine Biosecurity: Impact of INNS on marine sectors

---

It is [estimated](#) that INNS have cost the EU at least €12 billion per year over the past 20 years. In the UK this relates to approximately £1.7bn, however this is likely to be a significant underestimate and the figure is growing all the time. Many people want to know what impact an INNS would have on their business or sector. Whilst it is difficult to rule out impacts we have listed a range of likely potential impacts on different sectors which are based on real life examples from the UK and elsewhere.

## **Nature Conservation**

Significant loss in species diversity or changes to species composition are some of the greatest issues for nature conservation sites. A [review](#) by SRSL identified likely impacts on Marine Protected Areas in England and Wales from different marine INNS. Impacts include smothering or otherwise out-competing for food, light or space and predating, or feeding upon native species and changing the structure of the habitat such as growing into a biogenic reef or digging destructively into river banks.

## **Marine Recreation**

Due to their opportunistic nature, fast growth and ability to fix firmly onto a range of substrates (including those with antifouling coatings) many marine INNS have the potential to cause significant impacts to the marine recreation sector. For example the Trumpet tube-worm *Ficopomatus enigmaticus*, the barnacle *Amphibalanus improvisus* and the Wireweed algae *Sargassum muticum*, have all been identified as causing fouling problems leading to loss of earnings for marina operators. This loss is largely due to increased labour costs for cleaning structures and vessels and the reputational damage leading to loss of customers.

Recreational boaters are impacted in a number of ways including increased fuel costs from the additional fouling, damage to engines from propeller entanglement, exclusions from sensitive habitats and potentially the costs to marina operators will also be passed onto the customer.

## **Mariculture – Fin Fish**

The Japanese kelp or Wakame *Undaria pinnatifida* has the potential to have an economic impact on aquaculture through its heavy fouling ability. Impacts include increased labour and harvesting costs as equipment and boats require regular cleaning. Heavy infestations may also clog machinery and restrict water circulation. The Trumpet tube-worm *F. enigmaticus* and the Skeleton Shrimp *Caprella mutica* have both also been identified as causing fouling problems leading to loss of earnings for the aquaculture industry.

## **Mariculture – Shellfish**

Fouling organisms such as *the carpet sea-squirt Didemnum vexillum* and the Skeleton Shrimp *Caprella mutica* have the potential to overgrow bivalves and prevent their feeding causing slower growth and mortality. Heavy fouling INNS such as *Styella Clava* can increase regular maintenance and cleaning costs. The Veined Rapa Whelk *Rapana venosa* bores into the shells of bivalves also causing mortality. They also lead to increased costs due to the labour required for sorting and cleaning the additional infected stock and potential loss of market value.

Poisonous red tides containing blooms of invasive algae (dinoflagellates) can also close shellfisheries.

## **Shipping and Commercial Ports**

Shipping is impacted in four main ways by INNS. They are subject to increased costs incurred by i) hull cleaning and maintenance requirements, ii) ballast water management systems and maintenance, iii) biosecurity planning and associated administration both on ships and in their receiving harbours and iv) fast-growing biofouling INNS (such as the Australian barnacle *Austrominius modestus* and the copper tolerant Red-rust bryozoan *Watersipora subatra* and other algae, molluscs and tunicates) leading to additional fuel costs caused by the increased drag of the vessel. Some commercial ports reflect these additional burdens in terms of providing facilities to clean ships, deal with ballast water and manage their own biosecurity plans onshore and across their facilities.

## **Recreational Angling/Commercial Fishing**

A wide range of INNS, including fish, seaweeds, crustaceans and aquatic plants can affect angling and commercial fishing. Species, such as the Chinese mitten crab *Eriocheir sinensis* predate on native fish eggs while the Carpet Sea-squirt *Didemnum vexillum* can smother spawning grounds and *Hemigrapsus* crabs can out-compete the native *Carcinus maenas* traditionally used for bait as 'Peeler crabs', a similar impact to the American lobster *Homarus americanus*. Some NNS have become 'choke species' in other areas of the world and NNS in freshwater environments have been known to carry parasites that affect coarse fish, this is also possible in the marine environment.

## Coastal Recreation

Wireweed (*Sargassum muticum*) grows quickly in the correct conditions and can create large, smelly, unsightly heaps at the high-water mark which beach goers find off putting. It also forms dense mats which can clog propellers causing damage and inconvenience. The Pacific oyster *Magallana gigas* and the American jack knife clam *Ensis leei* can build significant reefs with their sharp shells they become dangerous for kayakers, paddleboarders, divers and swimmers.