



BACKGROUND

Marine Biosecurity

OUR DEFENCE SYSTEM

Imagine if we could rewind the clock and, knowing what we know now, stop the arrival of harmful introduced species like rats, possums, gorse and privet into New Zealand. We still have that chance for our coastlines.

Marine biosecurity, the maritime counterpart to terrestrial biosecurity, is all about taking action now to prevent the introduction and spread of harmful marine pests in our marine environments.

New Zealand already has one of the most robust marine biosecurity systems in the world, starting even before boats reach the border. We were the first country to introduce controls for both marine biofouling and ballast water, and a number of other countries have since followed.

Pre-border defences

Our biosecurity system starts long before vessels arrive with pre-border regulations and procedures. This includes agreements with international shipping companies and ports, analysis of risk, permits, and requirements that all vessels arriving from overseas must meet.

Border defences

The second layer designed to capture marine pests is a series of strategies in places at the border including inspections and clearance standards. The Craft Risk Management Standard requires all vessels to be free of marine pests on arrival and applies to all vessels coming into our waters.

Domestic interventions

Occasionally a marine pest will slip through the pre-border and border defences. Therefore once

vessels are in New Zealand we have domestic interventions - a system of surveillance and investigation in place. Our strategies at this level include modelling, sampling, trapping, monitoring and surveying. If marine pests are found, we have a system that enables us to provide a response. By way of example, when *Caulerpa* was discovered in Aotea Great Barrier Island in winter 2021 we were able to quickly put rules in place to reduce the risk of it being transferred to other locations while we assess the situation, discover if it has spread to other locations, and understand the next steps. We have also been able to suppress and even eradicate Mediterranean fanworm in places like Tauranga Harbour and Tutukaka. Education and advocacy plays a major role in domestic protections too.

The significance of the 'Top of the North'

The upper North Island, including Northland, Auckland, Waikato and Bay of Plenty, is home to more than 70% of New Zealand's domestic maritime vessels. This includes around 20,000 recreational boats and 1,300 commercial boats that sit in the water majority of the time (moored or berthed). With a coastline of accessible bays and good anchorages and coastal towns, the regions are tightly interconnected, with sea travel easy and frequent. This area also contains an estimated 167 of the 214 marine Non-Indigenous Species (NIS) recorded as established in New Zealand, many of which currently have regionally or locally restricted distributions. Fortunately only a few of these species are considered to have the potential to cause harm to our marine environment.

Most marine pests arrive in New Zealand on vessels. But some arrive via natural means, which takes a lot longer and provides many natural barriers.



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IMPACTS & MANAGEMENT

Our coastlines are intrinsic to human existence. They are our home, our food source, vital to our economy and our recreation. The following are indications of the economic and cultural damages that marine pests have the potential to cause.

Quantifying the impacts of marine pests on our economy

Aquaculture:

Between 4-10% of revenue from aquaculture is already spent addressing biofouling directly. Internationally, 25-60% of production losses have been attributed to marine pests. As well as direct biofouling impacts, such as competition for space and food, aquaculture species are vulnerable to diseases and parasites that can be introduced by biofouling organisms. In 2010-11 an outbreak of the virus ostreid herpesvirus OSHV-1 devastated the oyster industry in the TON regions, causing close to 100% spat and stock losses, closure of processing facilities and loss of jobs.

Fisheries:

Marine pests can affect fish habitat (including nursery habitat such as in estuaries), fish stocks (e.g. disease transfer) and fishing practices (e.g. physical interference with gear, loss of bait or catch from long-lines due to predation).

The sea star *Asterias amurensis* is not known to be in New Zealand so far but has caused devastating problems for fishing practices internationally because it takes bait from long lines.

Tourism:

The introduction of marine pests potentially affects attributes that underpin tourism, such as natural character and amenity values. While no hard data is available, we regularly become aware of stories of marine pests risking the viability of thriving tourist locations including *Caulerpa taxifolia* in California, the Pacific Oyster on the English Coast and the Crown of Thorns and Lionfish which are dominating and transforming entire reefs.

It is much more difficult and expensive to eradicate a harmful marine pest than it is to stop it arriving in the first place.

Marine industries (vessels, marinas, moorings, jetties, port infrastructure):

Biofouling on vessel hulls and structures adds to the cost of maintenance for owners. For example, Asian Kelp (*Undaria pinnatifida*) can cause line breakages on mussel farms in areas of strong current or wave action Just like the PSA pathogen is felt by the kiwifruit market, the

Oyster industry feels the impact of the *Bonamia ostreae* virus.

International trade:

The spread of pests, pathogens and parasites via biofouling can have negative trade implications due to impacts on market access or market perception. In the Top of the North Regions, the Ports of Auckland and Port of Tauranga handle equivalent to 53% (in 2017) of national merchandise trade.

Examining the effects on indigenous cultural values:

Marine pests affect the mauri (life force) of our coastlines. Negative effects, even small shifts, in the mauri of any one species or part of an ecosystem can have ramifications across the ecosystem, including for humans within it. This occurs alongside and compounds numerous other forms of degradation, such as over-harvesting, sedimentation and pollutants. Marine pests can impact the availability of kaimoana, and even relatively localised marine pest infestations have the potential to have significant cultural impacts, where they are intertwined with gathering of kaimoana.

Also affected are the aspirations mana whenua have to restore the mauri of marine environments, restore stocks and habitats of customary kai moana for commercial and non-commercial use, make coastal marine environments safe and pleasant for swimming and other recreation. For example, mana whenua/moana representatives within Tāmaki Makaurau have expressed concern about the potential of marine pests to impede plans to restore mussels and other kaimoana.

MARINE PEST EXAMPLES:

Australian Droplet Tunicate (*Eudistoma elongatum*)

With a slimy snout-like appearance this species can form big colonies on rocks, aquaculture equipment and marine structures. In its a free-swimming larval stage it can spread far and wide. It dies-back over winter but in summer it leaves no space for native species and changes the beautiful sights of our local beaches.



Mediterranean fanworm (*Sabella spallanzanii*)

With an ability to pack in 1,000 individuals per square meter, Mediterranean fanworm makes it difficult for other species in the vicinity to survive. Imagine it doing that in some of our pristine dive spots. It filters large volumes of water, feeding on nutrients and plankton, including the larvae of our much loved recreational fish species. Large numbers attached to your hull could be costing you a whole heap more in fuel too.



Understanding how marine pests impact our enjoyment of the sea for recreation

When marine pests reach high densities in natural ecosystems they change the experience of that place.

One of the undisputed effects of conspicuous marine pests (e.g. the kelp *Undaria pinnatifida*, fanworm *Sabella spallanzanii*, Australian droplet tunicate) is the dramatic change they cause to the natural character of the intertidal and/or subtidal seascape. This can include aesthetic appearance as is the case of Mediterranean fanworm or the unpleasant Australian droplet tunicate. It might be the sharp shells that prevent us from walking or playing on rocky areas. It might be that a native species we love to observe or fish for is displaced. Or a change to water quality for swimming.

Caulerpa (*Caulerpa brachypus* and *Caulerpa parvifolia*)

These two species of *Caulerpa* were discovered for the first time in New Zealand at Aotea Great Barrier Island by a fisherman in 2021. This was a particularly startling discovery for marine biosecurity experts because *Caulerpa* is a highly invasive species that spreads rapidly, dominating the seafloor habitat. The three bays where it was discovered are considered some of New Zealand's best fishing and cruising destinations. Aggressive management strategies are currently in place.



While not in New Zealand so far, the **Chinese mitten crab (*Eriocheir sinensis*)** has caused the equivalent of millions of dollars in damage in European waterways. Migrating crabs have clogged California's water delivery facilities and disrupted fishing operations. It is also known to be a human health hazard because it can be a host for the Oriental lung fluke.

