Factsheet

Aquatic Invasive Species

What are aquatic invasive species?

Aquatic invasive species include a variety of organisms — fish, invertebrates, algae, plants and even pathogens like cholera.

Some species arrive attached to ship hulls, and others are released into foreign ports via ballast water. Most species do not survive in the new environment, but some organisms are hardy, aggressive, prolific and successful invaders. They disperse rapidly and dominate native species.

How are aquatic invasives introduced?

Water bodies worldwide are being invaded by non-native aquatic species. Ballast water is a major vector for aquatic species invasions. Most vessels carry ballast water for stability when they are without cargo, but loaded ships can also carry ballast water.

Although many species seem too large to be transported by ballast water, the majority of marine organisms have a small larval stage (designed for dispersal), that is an ideal size to be drawn into a ballast tank and transported to the next port of call. Under the right conditions, and without natural predators and parasites, non-native populations can increase dramatically, threatening or displacing native species and radically changing the natural ecosystem.

Once established, invasive species are difficult to manage and nearly impossible to eliminate. The economic impacts can be staggering. Commercial and recreational fisheries throughout the world have sustained economic losses due to the depletion of native species.

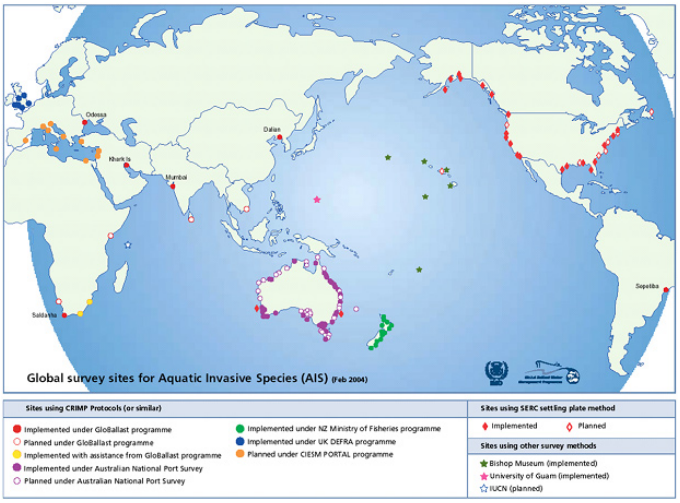
Some facts about aquatic invasives

• More than 250 introduced species have been recorded in the San Francisco Bay Area in the US. Between 1961–1995, one new species arrived, on average, every 14 weeks.

• It is estimated that on any given day more than 5,000 species of freshwater, brackish and marine organisms may be transported in ballast water in ocean-going vessels around the world.

• Water users in the Great Lakes basin region of the United States spent approximately US $1 billion for control of the zebra mussel from 1989–2002.

• In addition to ballast water, hull fouling is a major vector for the introduction of aquatic invasive species. In 2000, New Zealand spent $3.5 million to remove a species of invasive seaweed, *Undaria pinnatifida*, from the fouled hull of a single vessel that sank offshore.



Global survey sites. Source: IMO GloBallast Programme.

Survey methods

Around the SPREP region, a large number of sites in Australia, New Zealand and one in China have been surveyed using various different techniques.

In the SPREP region there are basically 3 different types of survey techniques that will be trialed and used: 1) The protocols developed by the Centre for Research on Introduced Marine Pests known as the CRIMP protocols. This is a more comprehensive, systematic and rigorous survey method targeting "high-risk inoculation" areas; 2) the Bishop Museum Survey method can be used for medium risk sites; and 3) Smithsonian Environmental Research Centre (SERC) established an introduced marine species survey programme useful for low risk sites.

Ballast water management tips

Open ocean exchange or retention is effective at reducing the risk of invasion, but ballast water treatment technology is widely viewed as the only real solution.

You can help control ballast water invasions by taking the following measures to minimize the uptake and release of harmful aquatic organisms.

Perform open ocean exchange (if safety permits)

Most open ocean species cannot survive in the nearshore environment. With open ocean exchange, ballast water containing organisms from nearshore sites is replaced with open ocean water containing species not well adapted to the nearshore environment, therefore significantly reducing the risk of invasion.

Keep records of ballasting operations

Record-keeping helps authorities track the spread of invasives. Many countries have specific requirements for record-keeping and reporting.

Reduce invasions via hull and anchor fouling

Invasive species can attach to hulls, piping and tanks and should be removed and disposed of properly on a regular basis. Anchors and anchor chains can be rinsed during all retrievals to prevent transport of invasive species from their point of origin.

Minimize ballasting in ports and coastal areas

Ballast water is one of the major transport mechanisms for introducing aquatic invasive species to coastal waters. Minimizing the amount of ballast water taken in from ports and coastal areas will reduce the number of potential invaders transported to the next port. Preventing new invasions is key to maintaining healthy harbors and coastal areas.

Avoid ballast uptake at night

Some organisms that live on the bottom or low in the water column during the day, rise in the water column at night to feed or reproduce, making them more available for uptake. The chance of bottom-dwelling organisms and sediments being entrained with the ballast water also increases when ballasting in shallow ports where sediments are disturbed by propeller wash.

Avoid ballast uptake in "hot spots"

"Hot spots" are water bodies that are particularly infested with invasive species, have toxic algal blooms or "red tides," are contaminated by sewage outfalls, or carry a waterborne disease such as cholera. Scientists and managers are working to identify global hot spots.

Selected marine invasive species of global concern

Asian clam (Potamocorbula amurensis)

This fast-spreading, hungry filter feeder can become so abundant that it can filter the entire water column in an estuary each day, severely depleting the phytoplankton population.

Northern pacific seastar (Asterias amurensis)

Larvae of this well-known native of Japanese waters were introduced to southeastern Australian and Tasmanian waters via ballast water in the 1980s. The seastar is one of the most predatory nearshore invertebrate species and is a voracious feeder, preferring mussels, scallops and clams.

Regulating ballast water internationally

The International Maritime Organization (IMO) developed voluntary guidelines for ballast water management in 1997, and adopted an international mandatory ballast management regime in February 2004: The International Convention for the Control and Management of Ship's Ballast Water and Sediments. The convention will enter into force 12 months after it is ratified by 30 States, representing 35 percent of world shipping tonnage.

Cholera bacteria (Vibrio cholerae)

A cholera epidemic, starting in Indonesia in 1961, circled the globe, aided by the transport of ballast water. Human health and shellfish industries were threatened.

Toxic dinoflagellates

Microscopic dinoflagellates can be transported with other plankton in both ballast water and sediments. Blooms of dinoflagellates can produce water discoloration known as "red tides." In some instances, dinoflagellates produce potent toxins that are transferred through the food web, harming or killing many marine organisms or even humans that feed on them.

Chinese mitten crab (Eriocheir sinensis)

The Chinese mitten crab has caused the equivalent of millions of dollars in damage in European waterways. Migrating crabs clog water delivery facilities and disrupt fish salvage operations. The mitten crab is a potential human health hazard as it can be a host for the Oriental lung fluke, a parasite that causes tuberculosis-like symptoms in humans.

North american comb jelly (Mnemiopsis leidyi)

A voracious, plankton-eating, comb jelly common to the Atlantic Coast of North America was introduced into the Black Sea and Sea of Azov in the early 1980s. The comb jelly population expanded rapidly, causing severe economic and social impacts. The cost to Black Sea fisheries is estimated at $250 million, and anchovy fisheries in the Sea of Azov are nearly extinct.

Information and illustrations in this factsheet adapted from Stop Ballast Water Invasions *by the West Coast Ballast Outreach Project, California Sea Grant Extension Program (http://ballast-outreach-ucsgep.ucdavis.edu). Used with permission.*

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