

Species invasions. Interaction with climate change, fishing, pollution and global shipping

Dramatic short-term changes in temperature and salinity, or even steady gradual ones, can stress native bottom ecosystems in coastal waters, adding to the stress of pollutants. Commercially fished species are vulnerable if their numbers are low and reproduction rate reduced. This increasingly common set of stresses leaves native ocean ecosystems threatened by invasive species transported around the world by ever-increasing long distance shipping. Physical and chemical monitoring can predict when the risk factors are highest, but, at present, only routine surveys by expert biologists can recognize new species introductions. Biodiversity baselines are needed on a global scale and are most efficient if standardized for comparability. These must be repeated frequently to detecting invaders before they become too widespread to control. Current efforts to identify DNA 'barcodes' for all species could lead to automated and even autonomous sampling for ocean life using large scale DNA 'chip' technology within a decade.

In the interim, internet accessible databases, like the Ocean Biogeographic Information System, can facilitate global biological monitoring and management of invasions. Knowing the conditions invasive species prefer in their natural habitat can predict regions they may invade, based on monitoring of conditions in new locations. The beautiful, but lethal, red lion fish from the Western Pacific and Indian Oceans was accidentally introduced into the North Atlantic by the aquarium trade. Comparing the physical conditions where it has colonized to known conditions predicts where it might spread.

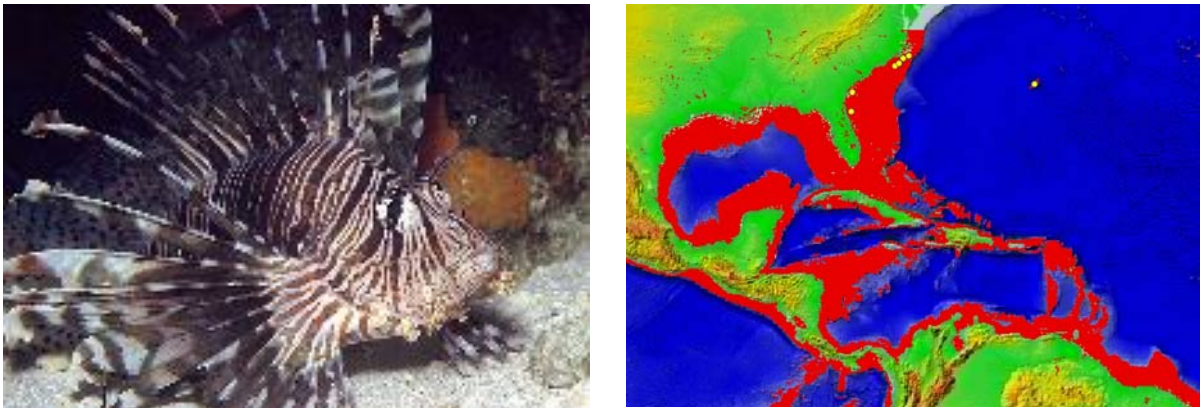


Figure 1. Known and potential invasions by the poisonous red lion fish, *Pterois volitans* (www.iobis.org)