



Can marine pests be transported and spread in bilge water?



Bilge water is water that is not deliberately pumped on-board a vessel, but which accumulates within it during the time at sea. Water can come on-board a vessel in a number of ways, including during rough conditions, the loading of wet equipment or in washing down gear and surfaces. Although the volumes of bilge water transported by vessels are small in comparison to the ballast carried by large commercial vessels, it is unclear how significant the biosecurity risks associated with it may be for the coastal spread of marine pests. This research seeks to characterise the risks posed by bilge water discharges by small vessels (< 20 m) in New Zealand coastal waters.

In 2014-15, researchers from the Cawthron Institute collected samples of bilge water were collected from 30 privately owned yachts and motorboats operating in the Nelson and Marlborough regions of New Zealand. The main objectives of the research were to:

1. determine the diversity and abundance of organisms contained in the bilge water of the vessels
2. investigate the proportion of biological material that was discharged through the bilge pump system, and
3. determine the relationship between voyage duration and the viability of biological material in the bilge.

Both conventional (morphological) and molecular methods were used to identify the organisms present in the samples. More taxa (118) were identified by the molecular methods than by visual examination (45) of the water samples. At least 5 of the species identified were not native to the region, but were known to occur there. Larvae of the solitary ascidian, *Ciona* spp. and the bryozoan, *Bugula neritina*, and fragments of the colonial ascidian, *Didemnum vexillum*, passed through an experimental bilge pump system relatively

unharmful. Survival of the propagules declined with the time spent in the bilge sump, but some survived for up to 3 days.

The study shows that bilge water discharges do pose some biosecurity threat and may contribute to local, coastal spread of unwanted species. Further research is needed to understand the risk profiles of different vessel types and potential mitigation measures.

The findings of this research are published in the scientific journal *Biological Invasions*. The project was funded by NIWA through the Strategic Science Investment Fund [Coasts and Oceans Research Programme 6 (Marine Biosecurity)].

Additional reading

- Fletcher, L., Zaiko, A., Atalah, J., Richter, I., Dufour, C., Pochon, X., Wood, S., Hopkins, G. (2017) Bilge water as a vector for the spread of marine pests: a morphological, metabarcoding and experimental assessment. *Biological Invasions*, 19: 2851–2867. doi:10.1007/s10530-017-1489-y
- Pochon, X., Zaiko, A., Fletcher, L.M., Laroche, O., Wood, S.A. (2017) Wanted dead or alive? Using metabarcoding of environmental DNA and RNA to distinguish living assemblages for biosecurity applications. *PLoS ONE*, 12(11): e0187636.10.1371/journal.pone.0187636

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