**WebTable 2. Examples of selection during entrainment and transport for vectors of unintentional introductions**

| *Vector* | *Taxa* | *Selection during entrainment into transport* | *Evidence* | *Selection during transport* | *Evidence* | *References* |
|---|---|---|---|---|---|---|
| Ship hull fouling | Bryozoan (*Watersipora subtorquata*) | | | Fouling bryozoan developed tolerance to copper due to the application of anti-fouling paints | Strong* | McKenzie *et al*. (2011, 2012a,b) |
| Ship full fouling | Diverse | Short residence time of vessels may select for early successional fouling organisms | Probable* | | | Berntsson and Jonsson (2003); Chapman *et al*. (2013) |
| Ship ballast water | Diverse invertebrates | Non-random entrainment of invertebrates may select for tolerance to human disturbance | Probable* | | | Briski *et al*. (2012) |
| Diverse (eg pet trade) | Birds | Populations adapted to human-altered habitats (AIAI) | Probable* | | | Hufbauer *et al*. (2012); Sol *et al*. (2017) |
| Diverse (eg hitchhikers and contaminants associated with agriculture and horticulture) | Little fire ant (*Wasmannia auropunctata*) | Populations from human-altered habitats are more tolerant of hot and dry conditions (AIAI) | Probable* | | | Hufbauer *et al*. (2012); Foucaud *et al*. (2013) |
| Diverse (eg ship ballast water and hull fouling) | Asian green mussel (*Perna viridis*) | Populations from human-altered habitats are more tolerant of low oxygen environments (AIAI) | Probable* | | | Hufbauer *et al*. (2012); Huhn *et al*. (2016) |
| Ship ballast water | Planktonic | | | Low oxygen and light levels, metal pollutants, and/or fluctuations in temperature and salinity may select for tolerance of harsh environmental conditions common in ports and human-altered habitats | Probable* | Briski *et al*. (2014); Chan *et al*. (2015) |

| *Vector* | *Taxa* | *Selection during entrainment into transport* | *Evidence* | *Selection during transport* | *Evidence* | *References* |
|---|---|---|---|---|---|---|
| Wood packing materials | Emerald ash borer (*Agrilus planipennis*) | | | Phytosanitary heat treatment of wood products induces a heat shock response of the wood-boring insects, allowing individuals to survive otherwise lethal temperatures | Probable* | Sobek *et al*. (2011) |
| Ship hull fouling | Fanwort (*Cabomba caroliniana*) | | | Overland transport on boat trailers may select for desiccation tolerance, which may promote the introduction and subsequent spread of non-indigenous populations in recipient ecosystems | Probable* | Barnes *et al*. (2013); Bickel (2014) |
| Ship hull fouling | Ascidians (*Styela clava, Botrylloides violaceus, Didemnum vexillum*) | | | Hydrodynamic conditions experienced by fouling ascidians on the hulls of ships during voyages may act as a selective pressure, favoring individuals with high attachment strength and/or low drag coefficient, which may promote further spread of the species | Probable* | Clarke Murray *et al*. (2012) |
| Tsunami marine debris objects | Macro- and micro-invertebrates, fish, and protists | | | Limited food source, increased sun exposure, and other stressors may select for populations with broad physiological tolerances | No direct* | Carlton *et al*. (2017) |
| Marine litters (eg plastic) | Macro- and micro-invertebrates, fish, and protists | | | Limited food source, increased sun exposure, and other stressors may select for populations with broad physiological tolerances | No direct* | Kiessling *et al*. (2015) |

**Notes**: *strong evidence, probable and no direct evidence represent: (1) cases with clear evidence for both selection during transport and evolved traits that contribute to invasion success; (2) cases that impose selective pressures relevant to adaptation to invade, but there is no study to demonstrate selection; and (3) cases where there is some reason to believe that selection is occurring, but we can only suggest why this might make a difference for invasion success, respectively.

## WebReferences


Barnes MA, Jerde CL, Keller D, *et al*. 2013. Viability of aquatic plant fragments following desiccation. *Invas Plant Sci Mana* **6**: 320–25.

Berntsson KM and Jonsson PR. 2003. Temporal and spatial patterns in recruitment and succession of a temperate marine fouling assemblage: a comparison of static panels and boat hulls during the boating season. *Biofouling* **19**: 187–95.

Bickel TO. 2014. A boat hitchhiker's guide to survival: *Cabomba caroliniana* desiccation resistance and survival ability. *Hydrobiologia* **746**: 123–34.

Briski E, Bailey SA, Casas-Monroy O, *et al*. 2012. Relationship between propagule pressure and colonization pressure in invasion ecology: a test with ships' ballast. *P Roy Soc B-Biol Sci* **279**: 2990–97.

Briski E, Chan F, MacIsaac HJ, and Bailey SA. 2014. A conceptual model of community dynamics during the transport stage of the invasion process: a case study of ships' ballast. *Divers Distrib* **20**: 236–44.

Carlton JT, Chapman JW, Geller JB, *et al*. 2017. Tsunami-driven rafting: transoceanic species dispersal and implications for marine biogeography. *Science* **357**: 1402–06.

Chan FT, Bradie J, Briski E, *et al*. 2015. Assessing introduction risk using species' rank-abundance distributions. *P Roy Soc B-Biol Sci* **282**: 20141517.

Chapman J, Breitenstein R, and Carlton J. 2013. Port-by-port accumulations and dispersal of hull fouling invertebrates between the Mediterranean Sea, the Atlantic Ocean and the Pacific Ocean. *Aquat Invasions* **8**: 249–60.

Clarke Murray C, Therriault TW, and Martone PT. 2012. Adapted for invasion? Comparing attachment, drag and dislodgment of native and nonindigenous hull fouling species. *Biol Invasions* **14**: 1651–63.

Foucaud J, Rey O, Robert S, *et al*. 2013. Thermotolerance adaptation to human-modified habitats occurs in the native range of the invasive ant *Wasmannia auropunctata* before long-distance dispersal. *Evol Appl* **6**: 721–34.

Hufbauer RA, Facon B, Ravigné V, *et al*. 2012. Anthropogenically induced adaptation to invade (AIAI): contemporary adaptation to human-altered habitats within the native range can promote invasions. *Evol Appl* **5**: 89–101.

Huhn M, Hattich GS, Zamani NP, *et al*. 2016. Tolerance to stress differs between Asian green mussels *Perna viridis* from the impacted Jakarta Bay and from natural habitats along the coast of West Java. *Mar Pollut Bull* **110**: 757–66.

Kiessling T, Gutow L, and Thiel M. 2015. Marine litter as habitat and dispersal vector. In: Bergmann M, Gutow L, and Klages M (Eds). Marine anthropogenic litter. Cham, Switzerland: Springer Open.

McKenzie L, Brooks R, and Johnston EL. 2011. Heritable pollution tolerance in a marine invader. *Environ Res* **111**: 926–32.

McKenzie LA, Johnston EL, and Brooks R. 2012a. Using clones and copper to resolve the genetic architecture of metal tolerance in a marine invader. *Ecol Evol* **2**: 1319–29.

McKenzie LA, Brooks RC, and Johnston EL. 2012b. A widespread contaminant enhances invasion success of a marine invader. *J Appl Ecol* **49**: 767–33.

Sobek S, Rajamohan A, Dillon D, *et al*. 2011. High temperature tolerance and thermal plasticity in emerald ash borer *Agrilus planipennis*. *Agric Forest Entomol* **13**: 333–40.

Sol D, González-Lagos C, Lapiedra O, *et al*. 2017. Why are exotic birds so successful in urbanized environments? In: Murgui E and Hedblom M (Eds). Ecology and conservation of birds in urban environments. Cham, Switzerland: Springer International Publishing.