

## **Biological Invasions**

### **Possible impacts of non-native plant, pathogen, invertebrate and fish taxa on the indigenous ichthyofauna in South African estuaries: A preliminary review**

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#### **Abstract**

We review the possible impacts of non-native biota on the indigenous fishes of South African estuaries, including macrophytes, algae, pathogens, invertebrates, and fishes. Freshwater macrophytes are one of the primary non-native groups in the oligohaline reaches of some predominantly open estuaries, lake and river mouth type estuaries, as well as the entire area of certain low salinity, temporarily closed estuaries. Anoxia and hypoxia in the water column below *Salvinia molesta* and *Pontederia crassipes* floating mats have caused fish kills in certain temporarily closed estuaries. Mass mortalities of fish in estuaries have arisen from harmful algal blooms (HABs) and a catchment-derived pathogenic water mould, *Aphanomyces invadans*. Non-native invertebrate species in local estuaries are derived from freshwater, estuarine and marine sources. The freshwater gastropod *Tarebia granifera* has invaded many subtropical estuaries and may be negatively impacting their food webs, with estuarine zoobenthivorous fishes not appearing to consume this mollusc. The marine polychaete *Ficopomatus enigmaticus* has invaded many South African estuaries and, in some of them, changed the zoobenthic food web by encrusting on hard surfaces and filtering particulate matter from the water column. This species also does not appear to be eaten by zoobenthivorous fishes within these systems. No non-native marine or estuarine fish species have been recorded in South African estuaries but non-native freshwater fish species now occur in 25% of estuaries in the region. Degraded estuaries in particular are more vulnerable to colonisation by non-native and translocated fish species than unimpacted systems. During the 1990s, a fish survey of 191 estuaries revealed that only 0.04% of the catch comprised non-native or translocated species but this percentage has increased in many estuaries in recent decades. Non-native and translocated freshwater fish species have successfully colonised the oligohaline and mesohaline reaches of many systems and there may be an impact due to predation on the eggs and larvae of resident estuarine taxa and the

recruitment success of catadromous and some estuarine-associated fish species. However, most non-native fishes have a limited tolerance for the salinity regimes found in the lower and middle reaches of many South African estuaries, with an even larger threat to the indigenous estuarine ichthyofauna coming from non-native plant, invertebrate and pathogen invaders. Based on this review, and other similar global studies, there is a developing paradigm that non-native invasions by fishes and other organisms into South African and global estuaries are driven primarily from freshwater taxa and not estuarine or marine species.