# Introduction

## Reviewing the Significance of Freshwater Rivers for Marine and Estuarine Organisms

1. Coastal plain ecosystems are some of the most biologically diverse ecological systems in North America and yet they remain relatively under-studied (Noss et al. 2015). Within the coastal plain, coastal rivers feeding the estuaries play a crucial role by supplying vital resources to estuaries and coastal environments (Montagna et al. 2023) and they are a mixing zone of fauna that providing key habitat for some marine and estuarine organisms. However, the overall significance of the connections between freshwater rivers and downstream estuaries for marine and estuarine organisms remains uncertain. While the importance of marine nutrients for upstream rivers has been examined in systems with charismatic migrations of marine fauna such as salmon, the extent of material and energy transfer upstream delivered by mobile fauna from the estuary into riverine ecosystems worldwide, and the subsequent impact of migrating species and lotic food webs, has not been quantified.
2. Well known instances of marine substances traveling upstream are associated with the migrations of anadromous species, such as salmon (Helfield and Naiman 2002; Lessard et al. 2009), and river herring (MacAvoy et al. 2000; Walters et al. 2009). However, the movement of materials upstream in coastal rivers may be much more widespread and significant than just those systems that are home to massive visible migrations (Doughty et al. 2016). For instance, a variety of species, including red drum (*Sciaenops ocellatus*), spotted seatrout (*Cynoscion nebulosus*), southern flounder (*Paralichthys lethostigma*), and blue crab (*Callinectes sapidus*), have been documented in coastal rivers along the Gulf Coast (Lowe et al. 2011; Woodcock and Walther 2014). Moreover, smaller species, such as gobies and prawns, were once abundant in coastal rivers but have quietly disappeared from much of their ranges over the past century (Bowles et al. 2000). River prawns in the Macrobrachium genus were once a significant gulf coast fishery in the 1800s and were distributed across much of the Mississippi River ecosystem, reaching as far inland as Ohio and Illinois (Hedgpeth 1949; Bowles et al. 2000). These species have vanished from 90% of their original habitat (Horne and Beisser 1977; Bauer and Delahoussaye 2008). The American eel (*Anguilla rostrata*), another migratory (catadromous) species, has experienced a 64% reduction in its overall population in recent years, with some river systems suffering losses of up to 99% of their historical populations (Arai 2016). These losses, many of which are rooted in historical factors, can be attributed to human-induced stressors such as decreased freshwater inflow, dam construction, and changes in land use. However, due to the scarcity of historical data on coastal rivers, it remains unclear exactly what has been forfeited.