

# Monsoon-driven succession of the larval fish assemblage in the East China Sea shelf waters off northern Taiwan

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**Abstract** The seasonal variation in the larval fish community related to the hydrography in the East China Sea (ECS) off northern Taiwan was studied from February to November 2004. Hydrographic conditions in the southern ECS are strongly influenced by the different water masses due to the seasonal monsoon system. A total of 173 taxa of larval fish belonging to 68 families and 105 genera were identified during the study period. The highest abundance of larval fish was recorded in winter, a moderate abundance was seen in late spring and summer, and the lowest abundance in autumn. Significantly higher abundances were usually found in the mixing zone than in ECS and the Kuroshio Current, and the number of species of larval fish was greater during the warm period than during the cold period. The larval fish fauna in the southern ECS is a mixture of endemic and exotic species; the latter come from the coastal waters of mainland China when the northeasterly monsoon prevails, from the South China Sea during the southwesterly monsoon, and from the Kuroshio waters year-round. The succession of water masses induced by the monsoon systems and the high nutrient levels caused by frontal turbulence and topographic upwelling may

determine the distributions of larval fish in terms of abundance and composition.

**Keywords** Community composition · Larval fish · Monsoon · Water masses · East China Sea · Upwelling

## 1 Introduction

The East China Sea (ECS), a marginal sea in the western North Pacific, is characterized by shelf waters on a wide continental shelf and oceanic waters that are strongly influenced by the Kuroshio Current (KC). The hydrographic conditions in the southern ECS off northern Taiwan is complicated because its waters arise from at least from three sources: the ECS shelf waters, the KC, and the mixing water (zone) (hereafter, the MIX) (Chern and Wang 1990; Chern et al. 1990). In the last few decades, a most interesting phenomenon has attracted the interest of oceanographers and led them to explore this area—a plume of cold subsurface water upwelling to the surface (Wong et al. 1991; Liu et al. 1992). This has been the focus of two major oceanographic projects: Kuroshio Edge Exchange Processes (KEEP) (Chern et al. 1990; Gong et al. 1992; Liu et al. 1992) and Long-Term Observations and Research of the ECS (LORECS) (Gong et al. 2000; Tseng et al. 2000; Wong and Zhang 2003). The succession of water masses in this area is controlled by two monsoon systems: the southwesterly monsoon in summer and the northeasterly monsoon in winter (Liu et al. 1992; Tang et al. 2000; Jan et al. 2006). In summer, the southwesterly monsoon prevails and pushes the South China Sea Surface Current (SCSSC) northward through the Taiwan Strait (TS) to the southern ECS. In winter, the northeasterly monsoon usually drives the cold, low-salinity, and nutrient-rich China Coastal

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