

## DURATION AND TIMING OF SPAWNING SEASONS IN MARINE TELEOSTS: A BIOGEOGRAPHICAL APPROACH

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### ABSTRACT

The duration and timing patterns of spawning seasons among marine teleosts fishes over broad geographic ranges from the polars to the equator has been reviewed. The review was based on 206 studies in order to evaluate potential patterns of the length or timing of spawning seasons in relation to latitude, habitats and taxonomic groupings patterns. This review confirmed that the timing and duration of spawning of marine teleost fishes is related to latitude. The spawning duration of fishes living in the equatorial region and the tropical regions is generally longer than that of species living in the subtropical and polar regions. With respect to their habitat, in general, the duration and timing patterns of spawning seasons of pelagic fish were not different to demersal fishes.

**KEYWORDS:** spawn, seasons, duration, marine teleost fish

### INTRODUCTION

The duration and timing of spawning seasons vary substantially among marine teleost fishes (Taylor, 1990; Munro *et al.*, 1990). Breeding seasons can range from periods of just a few days (Bye, 1990; Beddow *et al.*, 1998) to all year round (Stequert & Ramcharrun, 1996). Among the seasonal breeders, there is also considerable variation in the time of the year when breeding occurs (Sundararaj, 1981; Longhurst & Pauly, 1987). Some species spawn mainly during summer (Sabates & Martin, 1993), while other spawn during winter (Amara *et al.*, 1994; Fowler *et al.*, 1999). The processes underlying variation in the duration and timing of spawning seasons are poorly understood. To date there has been no comprehensive review of patterns in the length or timing of spawning seasons, making it difficult to formulate appropriate theories.

The timing and duration of spawning seasons appear to vary with latitude, both within and among species (Taylor, 1990). It is widely assumed that the length of the spawning season increases toward the equator as temperature increases and becomes less variable (Munro *et al.*, 1990). However, there have been no systematic comparisons over a broad latitudinal range to confirm this. Most studies on the spawning seasons of marine fish have been restricted to a single locality and also at high latitude locations. This restricts our ability to determine how single species alter their spawning patterns over potentially broad geographic ranges. However, over recent years, information on the spawning patterns of tropical species has been increasing. There have now been

sufficient studies on a range of species from different locations to detect major trends from the polar regions to equatorial environments.

There are several factors that are widely assumed as potential causative factors of the timing of the reproductive season. Photoperiod, temperature, rainfall and food, among other factors, are important in regulating reproductive cycles in teleost fishes (Baggerman, 1990; Taylor, 1990). Many species live over a wide range of latitudes and so encounter different temperature and photoperiod regimes at different locations. This can result in major differences in the timing and duration of reproduction within species (Wootton, 1990). Reproductive seasonality has been well described for high latitude species and is correlated with major seasonal changes in temperature and hours of daylight (Wootton, 1990). Temperature and photoperiod appear to influence both the timing and duration of the spawning season, with most temperate species having restricted spawning periods (Munro *et al.*, 1990). However, strong reproductive seasonality has also been observed at low latitudes in some freshwater and marine species (Bye, 1990; Taylor, 1990). This suggests that the assumption of longer spawning seasons in the tropics may not always apply. Before any conclusions can be drawn, however, a systematic comparison of spawning seasons of different taxa across a wide range of latitudes is necessary.

Marine teleost fishes living in different habitats (e.g. demersal and pelagic fish) experience different abiotic and biotic conditions. Micro climates associated with habitats may also influence reproductive strategies, including

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