Chapter 17
Evolutionary Consequences of Eel Migration

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17.1 Introduction

Fish migration is a regularly occurring habitat transition between the spawning area and growth habitat of a species. A conceptual model that superimposes the life cycle of migratory fishes onto a closed route of migration connecting the spawning area and growth habitat has been defined as a "migration loop" (McDowall 1992; Tsukamoto et al. 2002). In principle, each fish species has a migration loop specific to its life history and geographic distribution. Therefore, the differentiation of a new migration loop has the potential to cause reproductive isolation and hence speciation. This concept helps for an understanding of the evolutionary processes of fish migration as well as the migratory behavior and life cycle of fishes.

Diadromy is a migratory strategy in fishes that involves a regular migration pattern between fresh and salt water (McDowall 1992). It is a relatively rare behavioral trait, occurring in perhaps 250 out of the some 25,000 known fish species (McDowall 1993). Diadromous migrations have been observed in several taxa of fishes, suggesting that diadromy originated independently throughout fish evolution (McDowall 1992, 1993). Therefore, each migratory fish species might have experienced different selection pressures that resulted in variations in its life history. Diadromous fishes undertake two major habitat shifts in every generation: a migration from fresh water to the ocean, and another migration in the opposite direction. Some diadromous fish are semelparous (one single reproductive migration per generation), others are iteroparous (two to several reproductive events per generation). Anadromy, catadromy and amphidromy are all variants of diadromy. Anadromy refers to the migration patterns of fish, such as salmonids, that live in the ocean but return to fresh water to spawn. In amphidromy, such as observed in gobiids, the migrations are not directly tied to spawning, but to some other activity,

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G. van den Thillart et al. (eds.), *Spawning Migration of the European Eel,*