

ABSTRACT

The pattern of long term movements of the individuals of a local population, relative to other population members, constitutes the dynamics of that social system, and these movements are evolutionarily adaptive to the individuals involved. The study of social organization is incomplete without the knowledge of social dynamics, and in many animals, especially the cold-blooded vertebrates, this knowledge is lacking.

The social dynamics of the dusky damselfish, Eupomacentrus dorsopunicans, were investigated indirectly via an analysis of "foraging" behaviour and a comparison of the distribution of size classes on different habitat types. A more direct measure of emigration and immigration consisted of data collected during a six month census. Data on reproductive success, intraspecific aggression, and territorial size were also recorded.

Adults of both sexes were found on two different habitat types where they defended perennial territories. Adults inhabiting "discrete" coral blocks (which supported only a low population density) did not remain on them as long as adults on "continuous" habitats remained on continuous coral blocks (which supported a high population density). Dusky damselfish were often seen travelling between coral blocks, although they almost always returned to their home sites. These movements were termed "forays," and they were shown to be a mechanism by which individuals switched their territorial positions. Discrete habitat adults forayed more often and had a lower reproductive success than continuous habitat adults. Adults on discrete habitats, then, probably attempted to move onto continuous habitats. However, adults on continuous habitats were more aggressive than those on discrete habitats,

and this "aggressive gradient" evidently restricted the immigration of discrete habitat adults onto continuous habitats.

Dominance was found to be size related, with larger animals initiating more chases toward smaller individuals than vice versa. Adolescents, therefore, were subordinate to adults, and as they grew in size their territorial sizes also increased. These phenomena were construed to be the proximate causes of the dispersal of adolescents from continuous habitats to discrete habitats. This direction of movement for adolescents was indicated by the census data, as well as by the observation that the proportion of adolescents on discrete habitats was higher than the proportion of juveniles on discrete habitats. For this to occur, individuals must move from continuous habitats to discrete ones when they reach the adolescent size.

Planktonic larvae presumably settle randomly over various substrata, and differential mortality produces the observed dispersal pattern of juveniles. Juveniles did not foray, and post-settlement immigration by juveniles is unlikely.

The social system of the dusky damselfish is similar to other territorial species, and it differs strongly from species with a dominance social system. In general, juveniles or subadults of territorial species are forced out of the area of established individuals and attempt to move back as they mature. In dominance systems, juveniles, and often adolescents, are tolerated by adults, and group fission occurs by other means. Differences were also found between dusky damselfish and other territorial animals. The larval dispersal phase of the dusky damselfish is entirely without homologue in terrestrial territorial species, and the lack of any non-territorial individuals is also unique. In most

territorial species, some individuals which are forced away from the breeding grounds of the adults wander nomadically without setting up territories. Since wanderers were not found for dusky damselfish, any territorial openings on continuous habitats could be filled only by territorial owners from discrete habitats.