

Aligning Biological and Management Scales for Marine Conservation

Patricia M. Mace

Univ. of California & Oregon Inst. of Marine Biology, USA

In the oceans, as well as on land, biological and management scales are often mismatched. This is due to both jurisdictional divisions and to lack of data on persistence or change in distributions of organisms over time. Marine organisms exhibit an extreme variety of life history strategies and dispersal characteristics, with lifetimes lasting seconds to decades and movement occurring on scales of millimeters to thousands of miles. For most marine organisms, we do not know where they spend much of their lives. Pelagic fish and the usually tiny (on the order of millimeters) larvae common to marine animals are difficult to observe and track in the oceans.

We lack the finances, human resources, time, and in many cases, techniques to conduct necessary field surveys. However, examinations of life history strategies combined with oceanographic models and measurements, case studies of dispersal capabilities and patterns, and theories of larval dispersal provide guidelines as to the biological scales involved for organisms with different life histories.

This framework is useful both for informing what effects different marine conservation strategies are likely to be capable of, and what management scales are required for specific management goals. Such a framework is presented here along with a discussion on its application, both for identifying the effectiveness between different management approaches (such as pollution control versus area protection), and of different spatial scales of individual management techniques (such as differently sized protected areas).