1.1 About Ecopath with Ecosim

EwE6 is an ecological software suite for personal computers that has been under development for more than a decade. The development is now centreed at the University of British Columbia's Fishery Centre, while applications are widespread throughout the world. The software has more than 2500 registered users in 124 countries, and more than two hundred publications based on the software have appeared, see www.ecopath.org. The approach is thoroughly documented in the scientific literature, and key references are mentioned below. EwE has three main components: Ecopath - a static, mass-balanced snapshot of the system; Ecosim - a time dynamic simulation module for policy exploration; and Ecospace - a spatial and temporal dynamic module primarily designed for exploring impact and placement of protected areas. The Ecopath software package can be used to

- Address ecological questions;
- Evaluate ecosystem effects of fishing;
- Explore management policy options;
- Evaluate impact and placement of marine protected areas;
- Evaluate effect of environmental changes.

The foundation of the EwE suite is an Ecopath model (Christensen and Pauly, 1992; Pauly et al., 2000), which creates a static mass-balanced snapshot of the resources in an ecosystem and their interactions, represented by trophically linked biomass 'pools'. The biomass pools consist of a single species, or species groups representing ecological guilds. Pools may be further split into ontogenetic linked groups; a group may as an example be split in larvae, juvenile, age 1-2, and spawners (age 3+). Ecopath data requirements are relatively simple, and generally already available from stock assessment, ecological studies, or the literature: biomass estimates, total mortality estimates, consumption estimates, diet compositions, and fishery catches.

The process of constructing an Ecopath model provides a valuable end product in itself through explicit synthesis of work from many researchers. Several EwE models illustrate this, e.g., for the Prince William Sound (Okey and Pauly, 1998; 1999), the Strait of Georgia (Pauly et al., 1998b) and several North Atlantic models created as part of the Sea Around Us project activities at the UBC Fisheries Centre, (Guénette and Diallo, 2002). The model construction process has brought together scientists, researchers and data from state and federal levels of government, international research organizations, universities, public interest groups and private contractors. Key results include the identification of data gaps as well as common goals between collaborating parties that previously were hidden or less obvious. We find the process especially important for enabling the interest groups to take ownership of the model that is derived; this is especially required when operating at the ecosystem level, where multi-faceted policy goals have to be discussed widely as part of the management process. This is facilitated by the policy exploration methods included in the Ecosim model discussed further below.

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