3.1 An overview of Ecosim

Ecosim provides a dynamic simulation capability at the ecosystem level, with key initial parameters inherited from the base Ecopath model. See Ecosim inputs? and Ecosim outputs? for links to instructions for using Ecosim.

The key computational aspects are in summary form:

- Use of mass-balance results (from Ecopath) for parameter estimation;
- Variable speed splitting enables efficient modelling of the dynamics of both ?fast? (phytoplankton) and ?slow? groups (whales);
- Effects of micro-scale behaviours on macro-scale rates: top-down vs. bottom-up control incorporated explicitly.
- Includes biomass and size structure dynamics for key ecosystem groups, using a mix of differential and difference equations. As part of this EwE incorporates:
- Multi-stanza life stage structure by monthly cohorts, density- and risk-dependent growth;
- Stock-recruitment relationship as ?emergent? property of competition/predation interactions of juveniles.

Ecosim uses a system of differential equations that express biomass flux rates among pools as a function of time varying biomass and harvest rates, (for equations see Walters et al., 1997; Walters et al., 2000; Christensen and Walters, 2004). Predator prey interactions are moderated by prey behaviour to limit exposure to predation, such that biomass flux patterns can show either bottom-up or top down (trophic cascade) control (Walters et al., 2000. By doing repeated simulations Ecosim allows for the fitting of predicted biomasses to time series data.