

### 3.23 Parameter sensitivity

Ecosim does not (yet!) include any formal sensitivity analysis. Experience shows, however, that of the extra parameters added to those required by the typical Ecopath models, the most sensitive parameter is the [Vulnerability](#) setting. This parameter expresses the exchange rate between the prey being in vulnerable and non-vulnerable states (see Figure 3.3 in [Vulnerabilities in Ecosim](#)).

The vulnerability parameter is in general not subject to direct measurement. There are, however, other ways of estimating it, and Ecosim includes two independent methods of estimation:

- i. Build Ecopath models for a system covering two different time periods, and use a routine included in Ecosim to search for vulnerability parameter settings that with the given exploitation rates will make it possible to move from the first to the second model state;
- ii. Through fitting to time series data (see [Fitting to time series data](#) and [Hints for fitting models to time series data](#)).

It is possible and indeed recommended to use all of these methods to obtain estimates for the vulnerability parameters.