(Ellner and Fieberg 2003)

* Summary: The authors make a strong case for accounting for uncertainty in PVA models and the use of a global sensitivity analysis (Sobol’s index) to understand the effect of model inputs on metrics. This is different than a regression analysis of inputs on outputs because Sobol’s index does not assume a functional form and can therefore capture nonlinear interactions.
* Acknoweldge that most moders should use pvas to explore the relative benefit of several management actions rather than providing a measurement of absolute risk – see citations therein
* Most report that evaluating relative risk is more robust to absolute risk in terms of uncertainty in the data and model structure, this has rarely been tested
* There are 2 sources of uncertinaty in a model that uses estimated paramters: intrinsic variability and sampling distribution. This links to the prediction interval where the estimated error variance and the other uncertainty due to estimate of slope and intercept
* Argue for the use of simulation to estimate uncertainty
* A prediction interval is defined as having a specified probability of containing a future outcome over many repitation of collecting sample data, fitting the model and observing a subsequent outcome. PIs can be constructed by boostrap.
* See reference for Saether et al 2000 for an applied example
* To account for parameter uncertainty bootstrap samples are parameter estiates fothe fitted model and repeat the forecasting using each of the values
* Parameter uncertainty has a small effect on prediction intervals but a large effect on extinction risk
* Effectiveness of linear regression to do sensi depends on the model fit
* Sobol’ sensitivity indices do not depend on forms an dprovide an accurate measure of parameter sensitivity
* The message of the paper was that once a population has been modeled it is only a small step to model the process generating the data and assess uncertainty in model predictions due to sampling variability in parameter estimates by refitting the model to similated data and rerunning the model
* Think about assessing relative and abosolut risk

References

Ellner, S. P., and J. Fieberg. 2003. Using PVA for management despite uncertainty: Effects of habitat, hatcheries, and harvest on salmon. Ecology 84(6):1359-1369.