**Assignment #3: Multi-species CEATTLE Application**

**Introduction and Objective**

Assignment #2 involved conducting single-species assessments for hake, anchovy, and sardine. This assignment involves using CEATTLE to link these species via predation of hake on anchovy and sardine, and explore (a) how different estimates are key model outputs are to time-varying predation, (b) how sensitive results are to some aspects of diet data.

**Tasks**

* The file Adriatic-base.XLS contains the default values for the parameters needed to run a multispecies version of the model. Please review the tabs that pertain to the multispecies aspects (look at lecture G) then run the code and look at the plots.
* There are two main objectives for this assignment:
  + Explore sensitivity of the estimates of spawning stock biomass and recruitment to:
    - a constant temperature of 50C (see sheet *Temp\_data*).
    - changing the diet proportion data (see sheet *UobsWtAge*) using the values in the sheet *Diets* in spreadsheet EX3.XLS.
    - setting the basal value for natural mortality (see sheet *M1\_base*) for all species to 0.2yr-1 and double the default values for basal natural mortality.
  + Compare the estimates of spawning stock biomass and recruitment from the single-species assessment (base-case settings) and the various multi-species models. Identify what specifications lead to largest differences in results and the smallest. You may wish to change data weights and the parameters that determine multispecies effects (but ensure that hake always prey on anchovy and sardine). You may wish to look at how “other food” (in the sheet *control*) impacts the results.