**Exercise 3 Instructions: Pacific Fishery Ecosystem and Socioeconomic Interactions**

**This exercise is worth 25%of the course grade**

[Link to General Exercise Instructions](http://www.webct.pdx.edu/sysc514/514exins.htm)

The intent for the third exercise is to reinforce your skills at problem exploration/formulation & model development, the role of feedback, model specification & calibration, and debugging; and to then focus on:[debugging](http://www.webct.pdx.edu/sysc514/Verification.htm#DebuggingIntro)

[verification](http://www.webct.pdx.edu/sysc514/Verification.htm#VerificationIntro)

[exploring dynamic behavior](http://www.webct.pdx.edu/sysc514/ModelDynamics.htm)

[model validation](http://www.webct.pdx.edu/sysc514/Validation.htm#Validation_Outline)In order to do model validation, you must establish reference behavior up front.  In most cases, unlike Ex1 and Ex2, the RBP is NOT provided in the description.  For some of the options, partial reference behavior can be obtained from Senge's The Fifth Discipline.  In other cases, you will be able to establish plausible RBP by doing some research on the web or at the library at the beginning of your endeavor, as part of your problem exploration.  In any case, it is essential that you document the RBP against which you will validate your model before you build the model!  If you cannot find data or graphs, you may create a sketch of your beliefs about the RBP of the system being modeled.  Put the data, graphs, sketch into a file folder labeled "RBP" (really!).

In Exercises 1 and 2 of this sequence, VENSIM models were constructed to investigate, in turn:

* Basic population models of fish, with reproduction and death rates influenced by the carrying capacity of the environment
* Expansion of the population model to a scale assumed to be representative of an ocean fishery ecosystem, and the impact that shifts in the carrying capacity can have on population density
* Introduction of harvesting pressure on the fish population, in the form of a fleet of fishing vessels
* Interactions between harvesting pressure and the economy of the fishing fleet; further, the effects observed when changes in economic factors are introduced
  + these changes might have included modifications on the financial incentives for adding new vessels to the fleet, introduction of elastic supply-and-demand pricing for the fish harvests, etc.

For all of the above, the modeling efforts were based on loose and unsubstantiated assumptions about actual conditions encountered in the Pacific fisheries.

1) Collectreal world input data and RBP (output or outcomes) data for both the ecosystem and fishery economic factors.  Such data is a prerequisite for making models more realistic.

* To place practical boundaries on the scope of the exercise, focus on a SPECIFIC CATEGORY of the Pacific fishery economy/ecosystem
  + For instance, consideration of one category of fish, such as groundfish (flatfish, rockfish, roundfish, others), salmon, tuna, or another, as indicated by initial research
    - Oregon Pink Shrimp
  + And also possibly focus on one vessel type (such as trawlers)
    - “double rig” Trawlers

2) Expand the overall model to include societal factors that arise in communities that depend on the economic health of the fishery

* This represents a logical extension of the sequence of exercises, progressing from ecosystem (population dynamics) to economic (interactions with the fishing fleet) to the societal
  + Town Populace
  + Eulachon Populace?
  + How much of each trip is non-target species biomass?
* Of key interest is how the model specification and calibration efforts incorporate the real world input data obtained in your research

3) Verify and validate your model, using the RBP data collected in part 1 and other methods & activities, as appropriate.

4)Use the model to explore dynamic behavior and simulate the impact of the various policy options being considered to make the fishery more sustainable.  The goal is to assess how each policy is likely to impact the ecological, economic and societal "health" of the overall system.

Inclusion of green LED lights, escape hole, and bycatch rejection gratings

Locate amount of catch available per net-load and catch available per trip and compare amount of shrimp/total catch in each. How much of each trip is non-target species biomass?

* For instance, in 2002, regulations are being considered for reducing the number of vessels harvesting groundfish by 50%
  + either through restricting permits
  + or through vessel buy-back programs