

## **ESRP 310 Fall 2007, 4th Lab:**

### **Software Part III: Special Functions**

**Sept 6, 2007 at SLIC**

students may use SLIC from 2:00 to 5:00

Prof. Ford arrives to help at 2:30pm

#### **Agenda**

Both Stella and Vensim provide an extensive library of special functions to expand the power of modeling beyond the stocks, flows and converters that you have used in the previous labs. Appendix H of the book describes these functions and how they might be used in environmental models. This appendix is reference information, so you would not normally read it from beginning to end. Rather, you would read about selected functions which might prove useful for a particular model. From my experience with environmental modeling, three functions stand out as most important. This lab gives you the opportunity to practice with these functions.

#### **The MOD Function with a Population Model**

The MOD function is quite useful when environmental conditions change during different months of the year. To practice using MOD, build the model shown at the bottom of page 354 and simulate it for 120 months. Generate a time graph to verify that your results match the results shown at the top of page 355.

#### **The RANDOM Function with a Population Model**

Random effects are present in all environmental systems, and our models can help us learn about their impact on the dynamic behavior. Build the model shown at the bottom of page 355 and simulate it for 40 years. Generate a time graph to verify that your results match the results shown at the bottom of page 356.

#### **Use the SMTH1 Function to smooth the impact of the random disturbances**

With random effects present almost everywhere, systems adapt to the disturbances. One adaptation strategy is to “smooth” out the disturbances and react to the average value. The first order smooth function (SMTH1) allows us to represent the smoothing of information in our models. To practice using the SMTH1, build the model shown at the bottom of page 357 and simulate it for 40 years. Generate a time graph to verify that your results match the results shown at the top of page 358.