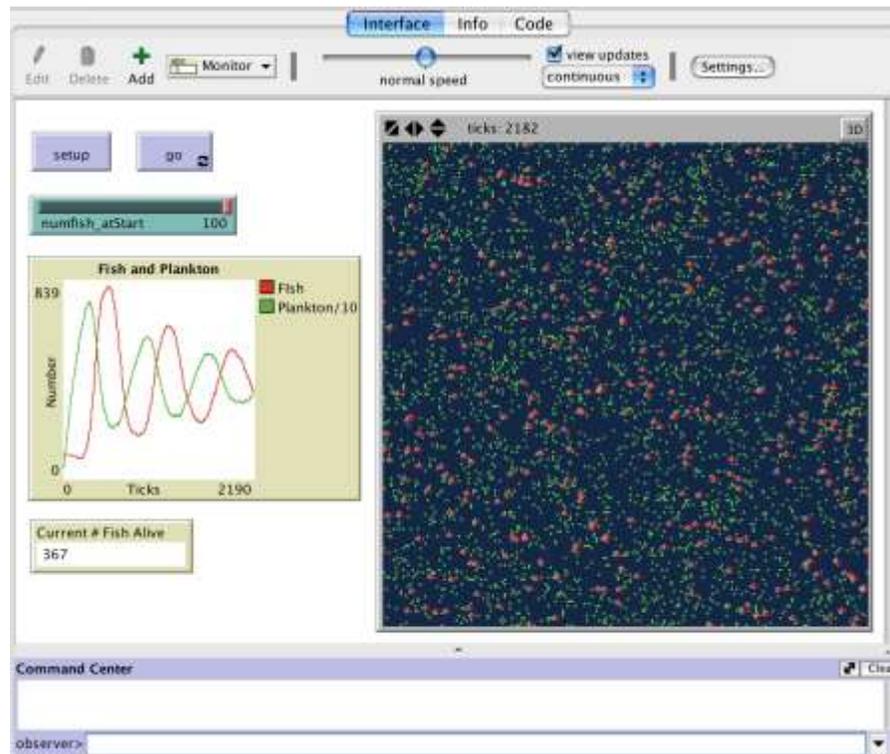


## CS108L Computer Science for All

### Module 6: Saving Nemo: An Ecosystem Model



In this lab, you will be creating a model that represents a simple ecosystem. You have fish swimming around eating plankton and having fun! The fish die if they can't find enough plankton to eat. The fish have baby fish if they can eat enough food. Your basic ecosystem!

#### The Basic Ecosystems Model:

The basic model has the following requirements:

- Change your world!
  - On the interface tab, choose settings and change the max-pxcor, and max-pycor (suggestion: 100). Also change the size of your patches (suggestion: 3). The world wraps around! Your agents live on a doughnut!
  - Change the color of your world to a blue because Nemo lives in the ocean!
  
- There are Fish in your world!
  - Create a breed of agent (fishes/fish or something like that)
  - Add a slider that allows the user to change the initial number of fish.
  - Fish are big, but NOT too big (size 5 or less)



- The fish are all the same color
- Each fish has its own variable to monitor its energy and the initial energy is not zero.
- Fish look like fish. Change the turtle's shape to a fish
- You want to observe the current fish alive.
- There is plankton in your world. Plankton make the patches green! Not all the patches are green though! Say about 1 in 100 patches are green at the start!
- Fish do their own thing....
  - Each tick, each fish moves in a wiggle and loses a bit of energy. Remember that the fish have an energy variable that needs to be set when a fish wiggles.
  - Fish eat plankton when they get to a green patch and then the patch turns blue. Also, when a fish eats plankton, it gains energy so its energy value increases.
  - Fish die if their energy falls to zero or below.
  - Each fish reproduces if it has enough energy to do so. Again, how much energy the fish needs to reproduce is up to you to decide so as to have the model behave as required. Note: Real fish are generally either male or female. They reproduce by the female laying unfertilized eggs, often in a gravel bed. Male fish then fertilize these eggs which (if all goes well for the fish) hatch sometime later. This model will be skipping these details (i.e. using abstraction).
  - When a fish reproduces, it loses energy. Remember that the fish have an energy variable that needs to be set when a fish is hatched.
  - How much energy the fish gains and loses for each activity (moving, eating, and reproducing) is up to you. However, too much or too little makes a difference! There is not one right answer; it's about BALANCE! You will need to decide what those values are so that the model behaves in the required manner (see Stable or Oscillating Population in the rubric).
- Plankton happen! Each blue, empty water patch randomly grows plankton (and changes the patch color to green) with a probability of 1 in 1000 each tick. Note: To keep the model simple we use abstraction to simplify this so we are modeling the presence of significant concentrations of plankton in the water as a simple green patch. In the real world, plankton are very small and as the density of plankton increases or decreases within a patch of water, the water would gradually change color. In the model, when an empty (blue) patch spontaneously generates plankton, you can think of this as a small population of plankton having the right conditions to increase their population density and that this increased density is represented in the model by changing the patch color to green.
- You are also very anxious about your fish and plankton. You create a graph that tracks how many of each are alive in the model as a function of time. Hint: to do this, don't forget about ticks!
- Additionally, you want to display number of fish currently alive for recording purposes. Make a monitor to observe this (hint: global variables).