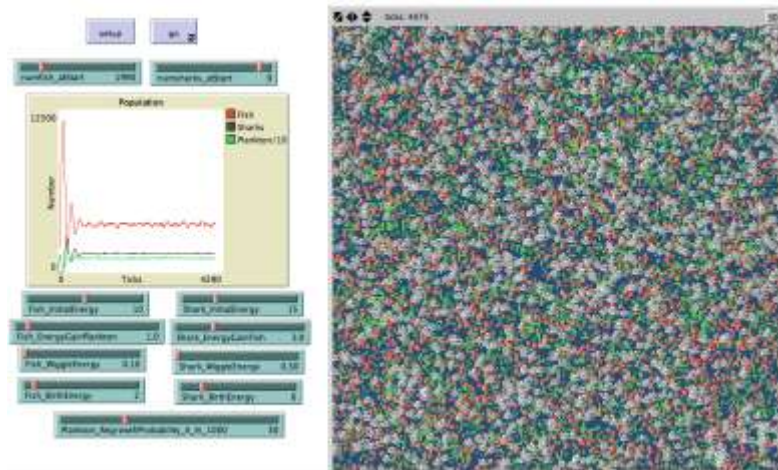


## CS108L Computer Science for All Module 10: Eating Nemo: A More Advanced Ecosystems Model



In this lab, you will be creating a more advanced model that represents a fish ecosystem.

Your model will include the following features:

- Fish swimming and eating plankton (as seen in Module 6)
- Fish die if their energy depletes. Energy is connected to movement and food consumption.
- Fish reproduce if they pass a certain threshold of energy.
- Ecosystem must have sharks that prey on the fish.
- Sharks die if their energy depletes and reproduce if they exceed a certain energy threshold.
- Both fish and sharks decrease their energy after they reproduce.
- You must add one of two extra features:
  - Fish and sharks grows as they age.
  - Fish and sharks swim faster as they gain energy.

### The Ecosystem Model:

The model has the following requirements:

- Set max-pxcor and max-pycor = 100.
- Set size of patches = 3
- Set the world to wrap around.
- Change the color of the interface to blue.
- For your agents:
  - Create two agents and set both shapes to fish.
  - Add two sliders that allow you to change the initial number of fish and sharks.



- Fish are big, but NOT too big (size 3 or less) and they are all the same color.
- Sharks are bigger than fish but not too big either (size 5 or less) and they are all one color that is different from the fish!
- Each fish and each shark has its own variable to monitor its energy and the initial energy is not zero.
- Create a graph that will plot the population of fish and sharks at any given time.
- Create a monitor that will record the population of fish and sharks.

Module 10: Eating Nemo Grading Rubric (20 Points Total)		
Done	Points	Task
	1	A: <ul style="list-style-type: none"> <li>● Submit a NetLogo source code with the file name: <i>M1.firstname.lastname.nlogo</i>.</li> <li>● The first few lines of your Code tab are comments including the following:  <pre> ;Student's Name: ;School: ;Teacher's Name: ;Date: </pre> </li> </ul>
	3	B: <ul style="list-style-type: none"> <li>● The code in the Code tab of your program is appropriately documented with “in-line comments”.</li> </ul>
	2	C: <ul style="list-style-type: none"> <li>● Your program includes a detailed Info tab with all the appropriate information. See Coding Standards Guidelines for more information.</li> </ul>
	2	D: Setup <ul style="list-style-type: none"> <li>● Your program is set up with the required world settings (must exceed the default 33×33 patch world).</li> <li>● Interface background is blue.</li> <li>● Model should initialize with a few plankton randomly dispersed.</li> <li>● You have a slider that inputs the initial number of fish and shark in the model.</li> <li>● You created a fish and a shark breed and they have a fish shape.</li> <li>● The fishes and sharks are two distinct colors.</li> <li>● Two sliders are used to specify how many fish and sharks are created with your setup procedure.</li> <li>● Each fish is set to a size larger than size 1 but no greater than size 3 and has an energy variable that has an initial value that is greater than zero.</li> <li>● Each shark is set to a size larger than the fish but no greater than size 5 and has an energy variable that has an initial value that is greater than zero.</li> </ul>



2		<p>E: Your fish, sharks and plankton behave correctly:</p> <ul style="list-style-type: none"> <li>• The fish and sharks lose energy when they move.</li> <li>• The fish eat plankton and gain energy when on a green patch, then patch turns blue.</li> <li>• The sharks eat fish when they share a patch. The sharks gain energy and the fish die.</li> <li>• Fish and sharks die if they do not have enough energy and reproduce if they have enough energy.</li> <li>• The plankton disappears (patches turn blue) when they are eaten and the plankton reproduces at a set rate (patches turn green).</li> <li>• You have a graph that shows the number of fish and the plankton as the model progresses.</li> </ul>
6		<p>F: Stable (Oscillating) Population:</p> <ul style="list-style-type: none"> <li>• When your model is run, neither the fish, the sharks nor the plankton die out completely right away.</li> <li>• There should be fish and plankton after 5,000 ticks.</li> <li>• <b>Please make sure to write down the values used to run the model in the Info section of the NetLogo program.</b></li> </ul>
<p><b>To get 20 points for the lab you only need to do one of the following two activities (G or H) – if you do both you get extra credit for the second activity (which is worth 1 point not 4, the 4 pts is only for the initial choice).</b></p>		
4		<p>G:</p> <ul style="list-style-type: none"> <li>• The fish and sharks grow as they age until they reach the maximum size for that type of agent!</li> </ul>
4		<p>H:</p> <ul style="list-style-type: none"> <li>• The fish and sharks swim faster as they get more energy. However, the faster they swim the more energy they lose.</li> </ul>
1		<p>I: (Extra Credit)</p> <ul style="list-style-type: none"> <li>• Your program has separate procedures for fish and sharks eating, moving, reproducing and dying. You call each of these procedures in your “go” procedure.</li> </ul>
1		<p>J: (Extra Credit)</p> <ul style="list-style-type: none"> <li>• Add a second species of fish.</li> <li>• The second species of fish must have the same procedures as your first species of fish.</li> <li>• However, these fish must behave differently from the first species (e.g. faster/slower initial speed, faster/slower digestion rate, etc.).</li> <li>• Plot the population of your second species of fish on your graph.</li> </ul>