Steps and Rules for bluegill simulation

1. Form 6 groups. Groups will be provided two bags- one with 20 large adult fish and another with 20 smaller fish which are “juveniles”, or offspring.
2. Create your population! Take 10 small fish and discuss in your group what proportion of bold and shy individuals you want to start your population with. However, you **may not start with MORE THAN 8** of either shy or bold (otherwise there is not a representative sample of the variation within your population).
3. Mark your fish with two different colored stickers to identify them as bold or shy.
4. Record how many bold and shy your group chose to start the population under “year 1-start columns” and color in your population in the process tool.

General rules:

* Every year we will go through predation, reproduction, and maturity in that order.
* **Predation**:
  + Only BOLD bluegill will be susceptible to predation.
  + Adults (larger fish) are also not susceptible to predation because they have grown large enough and don’t fit in their predators’ mouth.
* **Reproduction:** 
  + Each mature fish (LARGE fish) contributes ONE more small fish to the population.
* **Maturity:** Bold bluegill take two years to mature, shy fish take three years to reproduce.

**Bluegill Simulation Steps**

Year 1:

1. **Predation-** Using a random number generator (or put numbered items into a cup to draw from), determine how many of your small bold bluegill will be consumed (1-3 fish mortality).
2. **Reproduction-**  none of the fish at this point are large fish, so they cannot reproduce.
3. **Maturity-** fish are not old enough to reproduce yet.

Year 2:

1. **Predation-** Using a random number generator (or put numbered items into a cup to draw from), determine how many of your small bold bluegill will be consumed (1-3 fish mortality).
2. **Reproduction-**  none of the fish at this point are large fish, so they cannot reproduce.
3. **Maturity-** Any **bold small** bluegill are now replaced by **large bold** bluegill.

Year 3:

1. **Predation-** Using a random number generator (or put numbered items into a cup to draw from), determine how many of your small bold bluegill will be consumed (1-3 fish mortality).
2. **Reproduction-**  Add one small **bold** individual per large **bold** individual.
3. **Maturity-** Any **small shy** fish are now replaced with **large shy** fish.

Year 4:

1. **Predation-** Using a random number generator (or put numbered items into a cup to draw from), determine how many of your small bold bluegill will be consumed (1-3 fish mortality).
2. **Reproduction-**  Add one small **bold** individual per large **bold** individual AND one small shy individual per large shy individual.
3. **Maturity-** None of the small bold individuals are mature at this point (they are one year old). None of the small shy individuals are mature at this point (they are young-of-year).

Year 5:

1. **Predation-** Using a random number generator (or put numbered items into a cup to draw from), determine how many of your small bold bluegill will be consumed (1-3 fish mortality).
2. **Reproduction-**  Add one small **bold** individual per large **bold** individual AND one small shy individual per large shy individual.
3. **Maturity-** N/A because we are ending simulation here.